MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

BACK TO BASICS
- ENGINE MOUNTS
- USING ADHESIVES

48120

Become a BETTER PILOT
—page 56

Modeler Turned Grumman Test Pilot

SCALE SLOPE SOARING
P-38, B-17, Hellcat and more

Learn to Fly on First Flight with WINGO

March 1999
www.modelairplanenews.com
USA $4.95 CANADA $5.95
03>

MODEL AIRPLANE NEWS
FOUNDED 1929

EDITORIAL
Group Editor-in-Chief TOM ATWOOD
Editor-in-Chief LARRY MARSHALL
Editor GERRY YARRISH
Senior Editor CHRIS CHIANELLI
Associate Editors DEBRA D. SHARP, ROGER POST JR.
Editorial Coordinator DANA DONIA

PUBLISHING
Group Publisher LOUIS V. DeFRANCESCO JR.
Publisher YVONNE M. DeFRANCESCO
Associate Publisher SHARON WARNER

COPY
Copy Director LYNNE SEWELL
Copyeditors MOLLY Z. O'BYRNE, JANE HICKOK, COREY WEBER

ART / DESIGN
Art Director ALAN J. PALERMO
Associate Art Directors
ANGELA A. CARPENTER, BETTY K. NERO
Promotional Art Director
LESLIE COSTA
Assistant Art Directors
ALESSANDRA M. CIRILLO, JOANNA WINN
Staff Photographer WALTER SIDAS

ADVERTISING
Director of Advertising SHARON WARNER
Assistant Manager JILL ELLEN AMALFITANO
Advertising Account Executives
MONA TASSONE, KATHRYN GEARHART
Advertising Traffic Administrator
SIRI A. WHEELER
Advertising Coordinator ANN T. WIEBER

CIRCULATION
Circulation Director NED BIXLER
Circulation Assistant P.J. UVA

OPERATIONS
Director of Operations DAVID BOWERS
Production Associates
CHRISTOPHER HOFFMASTER, TOM HURLEY

CORPORATE
Chairman DR. LOUIS V. DeFRANCESCO
President and CEO MICHAEL F. DOYLE
Vice President G.E. DeFRANCESCO
Secretary L.V. DeFRANCESCO
Treasurer YVONNE M. DeFRANCESCO

CONTRIBUTORS
Dave Baron, Rick Bell, Joe Beshar, Mike Billinton, Bernard Cawley, Roy L. Clough Jr., Don Edberg, Guy Fawcett, Dave Garwood, Dave Gierke, Greg Gimlick, Henry Haffke, Greg Hahn, Tom Hunt, John Kauk, Michael Lachowski, Andy Lennon, George Leu, Mike McConville, Tim McDonough, Jerry Nelson, Jim Newman, Jim Onorato, Dave Patrick, Dave Platt, Randy Randolph, Jef Raskin, Carl Risteen, Jim Ryan, Jim Sandquist, Keith Shaw, Jim Simpson, Faye Stilley, Craig Trachten, Roy Vaillancourt, George Wilson, Dan Wolanski, Nick Ziroli.

AirAGE
100 East Ridge, Ridgefield, CT 06877-4606 USA
(203) 431-9000 • fax (203) 431-3000
Email man@airage.com
Internet www.modelairplanenews.com

Member Audit Bureau of Circulations

PRINTED IN THE USA

MODEL AIRPLANE NEWS

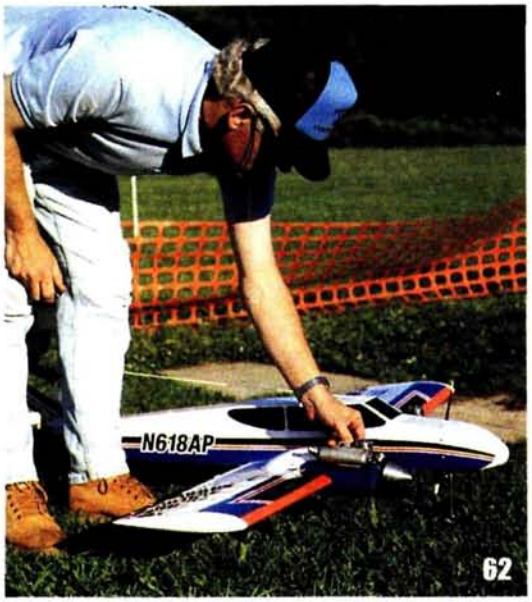
MARCH 1999 • VOLUME 127, NUMBER 3

ON THE COVER: main image—Brian Laird's P-38 does a photo pass at Soar Utah (photo by Dave Garwood); inset—We test the Hobby Lobby Wingo (photo by Walter Sidas).

Features

Construction

Reviews



Columns

Departments

EDITORIAL

BY LARRY MARSHALL

The Social Side

LAST WEEKEND, Gerry Yarrish and I made the two-hour drive down to "Scale Techniques" columnist George Leu's house. We spent the day with him investigating everything and anything in his shop. We discussed his Usher F-100, which sits in its first coats of paint, looking beautiful. We discussed a couple of large Zeros and an ME-109G he has in various stages of construction. We rolled out plans for a Jet Hangar Hobbies Mirage and discussed building jets. We had some discussions about building techniques and another discussion about scale judging, and we even shot some photos for a "how to" article. We kidded one another ruthlessly, which kept us laughing most of the time. Gerry and I headed back to Connecticut feeling as though we'd had a full day of modeling fun.

None of this is of particular significance to anyone but Gerry, George and me, of course, except that it's an example of what modelers do. This hobby, sport, or whatever you want to call it, isn't just about flying radio-controlled models. Neither is it just about building models. In fact, much of what goes on that brings joy to modelers is social and the airplanes are merely a focal point for those activities.

Think about it: when you spend the day at the flying field, how much of that time is actually spent with your plane in the air and your hands on a transmitter? If you're like most of us, it's only a small portion. The rest of the time is spent talking and joking with your buddies in the pit area. Would you have as much fun if you flew alone?

Much of our time is spent looking at other people's airplanes while they're looking at ours. Everyone gets excited when a new plane shows up, as it is much more than a new model airplane: a new plane provides fodder for a bunch of new discussions. There will be "How'd you do that? " discussions. If it's a scale plane, there will be discussions about color, markings and where/how the real plane saw service. There will be discussions of the power system, power to weight ratio and performance. The only thing that will quiet the crowd is the airplane rolling down the runway on its first flight. But as soon as the wheels touch the tarmac on the plane's return to earth and the applause dies down, the discussions will resume. The flight will be replayed in words several times, flight characteristics and required trim adjustments discussed, and a liberal bunch of "atta boys" will be awarded to the builder.

George Leu (center), Gerry and I (seated) enjoyed an afternoon in the inner sanctum of George's shop. Gerry took the photo.

Yes, talking is what we do the most, and for most modelers, I'm convinced the social components of our hobby are enjoyed the most. How many of you count as "good friend" at least one fellow modeler? How many of you travel significant distances to fly at meets with friends you see but once or twice a year? Ever been to an event that was rained out? Did you still have fun? Me, too.

We are, after all, social animals, so none of this should come as a surprise. The 19th hole is still the most popular hole on any golf course. Tailgate parties at football games fill stadium parking lots, and sports bars are all the rage. It's not surprising that those of us in modeling have our own versions of these social pastimes. Heck, we even have our own versions of the "less filling/tastes great" debates, as we discuss the virtues of big versus small airplanes, gas versus glow powerplants, fiberglass versus wood construction and whether downwind turns are any different from upwind turns.

I suppose someone should study the sociology of our modeling community. Maybe within these interactions lie the secrets to why we keep some people in the hobby and lose others to alternative pastimes. Maybe we'd learn a bit about ourselves; what makes us tick; what's important and what is not. In any case, I do know that my modeling friends are far more important to me than my model airplanes.

FROM MODELER TO TEST PILOT

One of the really neat things about this job is being able to meet some of the "greats" in full-scale aviation because of their involvement with our sister publication, *Flight Journal*. One such person is Corky Meyer. For those of you who don't know Corky, he was a test pilot for Grumman during the development of the Avenger, Wildcat, Hellcat, TigerCat, Bearcat, Panther and many other Grumman aircraft of that era. He also did fighter comparison testing of planes such as the Spitfire, Fw 190 and Corsair. But most of all, Corky is one of the nicest, most unassuming gentlemen I've ever met. If you prod him just a bit, he will provide an endless stream of personal heroic flight stories, and yet he explains, "I was just surprised that someone would pay me to have so much fun." In this issue, Corky tells the story of his transition from modeler to test pilot in, well, "Corky style." I'm sure you'll enjoy it. +

New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

AIR SCOOP

BY CHRIS CHIANELLI

KYOSHO

182

Kyosho's Super Quality series of ARFs earned a reputation of being well-built, lightweight models, and the same should hold true of the new Cessna 182 Skylane. This is a scale replica right down to the tapered fuselage and droop wingtips. The kit features a fiberglass-reinforced plastic (FPR) fuse that comes white gelcoated. The FPR cowling and wheel pants are also fiberglass reinforced and white gelcoated. The balsa/foam-core wings are also pre-built and covered. The extensive hardware kit includes landing gear, engine mount, wheels and a 270cc fuel tank that provides up to 10 minutes of flight, depending on the engine used. Specs: wingspan—62 inches; wing area—495 square inches; weight—5.3 pounds; engine requirements—.40 to .46 2-stroke or .45 to .60 4-stroke.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

HOBBY LOBBY Eindecker

Slightly faster and more powerful than Hobby Lobby's SlowFlyer, the Eindecker can fly in a breeze. Like the SlowFlyer, it is 95 percent built and qualifies as a park flier. You can fly it in restricted areas, such as small parks, ballfields and backyards. It turns quickly, takes off promptly, and it is reparable.

With its 400-size motor, it is 70 percent more powerful than the Hobby Lobby SlowFlyer, yet has a duration of about 10 minutes on a battery charge.

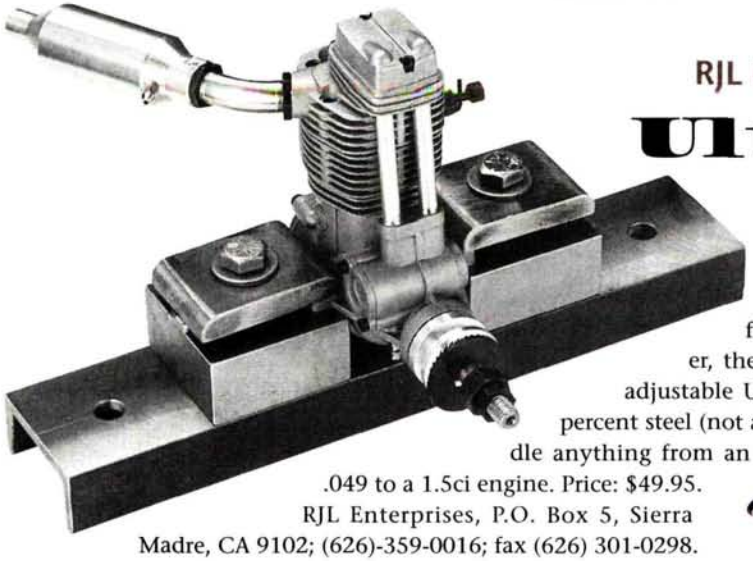
The huge, high-lift, ready-built 50-inch wing is made of flexible Novalight foam with carbon-rod reinforcing. Flying weight is about 11 ounces (4 ounces more than the SlowFlyer), and the wing area is 452 square inches, designed for rudder, elevator and motor control. Separately, the Eindecker costs $59, and the matching motor/gear/prop assembly costs only $31.50. If you purchase the complete package, which includes absolutely everything you'll need—Hitec Focus 3 with Super Micro servos, charger and electronic speed control—the Eindecker costs only $49!

Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948; website: www.hobby-lobby.com.

THE FIFTH CHANNEL IS FREE!

Whenever the brand JR is mentioned, many fledgling pilots think, "Yea, those beautiful radios for the experienced jet pilots." While it's true that JR radios are extremely popular with those difficult-to-please competition jet jocks, JR hasn't forgotten the sport and fledgling pilots, and the new F400 EX is proof. Not only does this radio come with ball-bearing S517 servos, but JR has also thrown in a fifth channel free! The new EX 5-channel version is the same price as the standard 4-channel F400 it replaces. Think about it: you get JR quality at a 4-channel economy price ... with an extra channel to boot. I like that a lot.

Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; website: www.horizonhobby.com.



RJL HEAVY-DUTY TEST STAND

Ultra Stand

Want to do some engine testing/bench running, but can't find a no-nonsense, ultra-heavy-duty engine test stand? Well, here it is. Wooden types are OK for smaller engines, but for handling big horsepower, the Ultra Stand from RJL is the ticket. The fully adjustable Ultra Stand is machined from 100-percent steel (not aluminum) and can handle anything from an .049 to a 1.5ci engine. Price: $49.95. RJL Enterprises, P.O. Box 5, Sierra Madre, CA 9102; (626)-359-0016; fax (626) 301-0298.

FAMILIAR NAMES

Take ARF Form

Here are two new ARFs from Global. Above is the Kwik Fly 60L. For those of you who didn't know, the Kwik Fly is the pattern design with which Phil Kraft won the 1964 AMA world championship. Even today it makes an excellent—and very forgiving—sport/pattern model. This all-wood ARF features a thick, symmetrical airfoil, long tail moment and big stabilizer, which make it track well in flight. Specs:

wingspan—67.5 inches; wing area—877 square inches; weight—6.5 to 7 pounds; engine—.61 to .75 2-stroke.

Also shown is the Schoolboy, a 90-percent-built, 50-inch wingspan, shoulder-wing trainer. Like the Kwik Fly, it is all-wood construction and comes covered. Some features are polyhedral wing and stall-resistant, computer-designed airfoil for superlative stability. Specs: wingspan—50 inches; wing area—325 square inches; weight—30 to 36 ounces; engine—.09 to .15; radio required—3-channel. Both the Kwik Fly and Schoolboy include hardware such as spinner, tank and wheels.

Global Hobbies, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 963-0133; fax (714) 962-6452.

AIRTRONICS

Available in aircraft and helicopter versions, the RD6000 narrowband, PPM/ RFM, PCM/FM, 6-channel, computer radio is designed for helicopter, sail-plane and powered models. It was designed for the needs of beginners and advanced pilots. Basic features for aircraft and heli versions include: 4-model memory; stopwatch; digital trims; large-screen, liquid-crystal display;

RD6000

dual rates on elevator and ailerons (rudder on heli version); endpoint adjustment on all channels; model type selection; center-adjust, data-reset, high-capacity Sanyo transmitter and receiver Ni-Cds and low-battery, high-throttle and power alarms. The aircraft version has these features: exponential; fail-safe/hold (PCM RX only); receiver battery fail-safe (PCM RX only); flaperon, spoileron, elevon, aileron diff, landing diff and crow mixing; dual-rate alarm and two compensation mixers. The heli features: three 5-point pitch curves; two 5-point throttle curves; revolution mixes for tail rotor; gyro-gain adjustment; two compensation mixes; four types of CCM mixing and custom-menu options.

Airtronics, 1185 Stanford Ct., Anaheim, CA 92805; (714) 978-1895; fax (714) 978-1540.

The Next Step Now

If you've mastered the high-wing trainer scene, Hobbico's new SkyVista may be the fastest way to the next step of a low-wing trainer. Like the high-wing AirVista, the SkyVista requires only a screwdriver and a pair of pliers for final assembly—no gluing, drilling or sanding. According to Hobbico, "Even if you have no previous experience, you can have the SkyVista ready to go in just one evening." Assembly shortcuts like plug-in wings and bolt-on tail group save tremendous building time. Specs: wingspan—62 inches; wing area—685 square inches; weight—5.5 pounds; wing loading—18.5 ounces per square foot; engine requirements—.40 2-stroke.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008; website: www.greatplanes.com.

JK AEROTECH Tank/Mount

Here's a quick look at JK Aerotech's new combination motor mount/fuel tank for its .049 and .061 engines. This anodized-aluminum mount is designed for Norvel engines, but it will also fit Cox Tee Dee .049 and .051 engines. The tank has a ½-ounce capacity.

JK Aerotech, 10800 S.E. Orient Dr., Boring, OR 97009; website: www.teleport.com.

JET SAFETY AND SUCCESS FROM BVM

From what I've seen over the years, safety and success are two inseparable concepts at Bob Violett Models. Here are a couple of products that attest to this BVM philosophy. First is Bob's Heat Shield. In certain installations, high-temperature exhaust gases from turbine or piston engines can end up too close to airframe parts; sometimes, it's unavoidable. While tailpipes and mufflers do contain the flame, connective heat can still be too much for balsa, plastic and fiberglass structures in close proximity. Two or three coats of the water-based, ceramic Heat Shield will successfully protect internal structures that may possibly be at risk.

The outer surface areas that have been treated internally with Heat Shield, such as engine cowls and fuselage segments adjacent to turbine tailpipes, will remain cool. As for safety enhancement: according to BVM, "In the unusual case of a turbine tailpipe fire during startup, you will have several seconds longer to extinguish it before damage occurs."

Next, BVM's Kevlar Fuel Cells. No matter which brand of turbine you run, you need sufficient fuel on board for acceptable flight duration. This means successfully fitting enough fuel into oddly shaped areas within the model's airframe. BVM addresses this need with these custom-made fuel cells for its line of turbine-compatible models. And safety? For years, Formula 1 and Indy full-scale racecar designs have successfully protected drivers from explosive, crash-induced fires by incorporating Kevlar fuel cells within the car's frame. The stuff is exceedingly rupture-resistant.

While BVM Kevlar Fuel Cells are, understandably so, designed to maximize fuel capacity in BVM designs, they may well fit nicely into other manufacturers' airframes. Therefore, Bob offers full-size drawings so that modelers can investigate without having to purchase the cells.

BVM, 170 State Rd. 419, Winter Springs, FL 32708; (407) 327-6333; fax (407) 327-5020; website: bvmjets.com.

AIRWAVES

Our readers write back

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," MODEL AIRPLANE NEWS, 100 East Ridge, Ridgefield, CT 06877-4606 USA; email man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

JANUARY COVER CONTEST WINNERS

Those listed below were the first six people to properly identify the original date of publication of the Joe Kotula painting used on our January 1999 cover. It was October 1959. Some participants confused it with Joe's May 1943 cover, which also showed an SBD Dauntless.

- Paul Howard, Baltimore, MD.
- Gary Jubin, Green Bay, WI.
- Robert Ogden, Normal, IL.
- Ted Purcell,Watseka, IL.
- E.C. Spencer, Scottville, MI.
- Robert Turner, Columbia, MO.

SPIRIT OF YESTERYEAR RECALL

We at Spirit of Yesteryear Model Aircraft Co. seek your assistance with regard to a correction needed to one of our 1998 revival models, the Leisure Wasp. Though we have never seen you print a "recall" before, we feel it better to admit to our blunder than to be judged ungracious in correcting this matter.

The size of the plan varied greatly, and while the wood fit perfectly to all adjoining parts, some modelers assumed that it had been wrongly cut.

Spirit of Yesteryear will be pleased to send any purchaser (or dealer) of the Wasp a replacement plan. To compensate them for their inconvenience, modelers will also be sent a discount coupon for future purchases. Modelers should send proof of purchase with their name and address to Spirit of Yesteryear, 40 Holgate St., Barrie, Ontario, Canada L4N 2T7.

J. STUART PEARCE
Barrie, Ontario.

TRIMMING YOUR MODEL FOR AEROBATICS

I read with interest Daniel Wolanski's "Trim Your Model For Precision Aerobatics" (December '98)—a methodically written and well-illustrated article. I'm not clear about one part: "... disconnect the ailerons from the linkage; extend the ailerons to the maximum upward position and cover the V-shaped crevice...." How is this done? Perhaps I'm not seeing something that's simple, but there you go. [email]

BOB WILLIAMS

We are trying to seal the gap between the aileron and the wing trailing edge. Go ahead and disconnect the aileron linkage from the servo so your aileron will be free to move up and down without grinding the servo gears. Now, lay the wing on a table with the bottom side up. Extend the ailerons away from you to create a V-shaped groove between the aileron and wing trailing edge. Cut a strip of covering material approximately 1 inch wide and the length of your aileron. Install it inside the "V" using your trim iron. Now you have a simple but effective sealed-hinge line.

DANIEL B. WOLANSKI

HELICOPTER SIMULATORS FOR NEWBIES

Larry, I enjoyed reading your heli article in the November '98 issue. I have flown a Nexus all summer long, and it has been great—a virtual rebirth in the hobby for me, after more than 25 years. I'm also very happy to see the addition of the helicopter column. Hope your interest level in helis stays high. Get on the simulator this winter!

By the way, simulators were the only things you left out in your advice to beginners. To me, Aerochopper made all the difference this time around.

TONY IANNUCELLI
Portsmouth, RI

I feel the same way about my new flying experiences with helicopters. It's great to take both airplanes and helicopters to the flying field.

You're right; I should have discussed helicopter simulators in the article. They are yet another reason people are having so much success with helicopters these days. I've been using the CSM heli simulator and it has helped me considerably. LM

ELECTRIC FUEL TANKS EXPLAINED

You cannot imagine how many magazines I've read and specialty booklets I've bought and how many questions I've asked during the past few years just to have you sum up everything that has been missing about electrics and their batteries in your article, "Fuel Tanks for Electrics" (January '99 issue). This is the article a lot of us have been waiting for. How to evaluate batteries by size and type and what all those designations mean. Up until you discussed it, there was a piece of the puzzle missing, and yet I didn't know quite how to put my finger on it.

Thank you so very much for touching on such a basic yet rarely discussed subject. This was a terrific article, and I will refer to it frequently. Now I'm not afraid to look at batteries. The information you provided enables me to pick my batteries for whatever project with confidence. Makes me wish I had had you for a science teacher in my younger years. Keep up the terrific way of explaining and putting everything into perspective. I'm already looking forward to next month's magazine. [email]

BORIS SVEREV

Thanks for your kind words; I'm glad you found the article useful. Often, it's the basics that get in the way and, as you say, we often overlook describing some of these simple nomenclatures that empower people to make their own decisions. When it comes to Ni-Cd nomenclature, you're not alone it seems, as I've received a bunch of kind letters because of the column. LM

WANTS SHORT SUNDERLAND PLANS

I am very interested in building a Short Sunderland, as published in "Pilots' Projects" in the December 1998 issue. Do you have plans available, or must I get them from Jan Hermkens? [email]

JIM KRAMER

The Short Sunderland is one of the most majestic seaplanes ever built, and the model by Jan Hermkens is a masterpiece. The photo of the one pictured here was shot flying over the Short Seaplane Works in 1943.

We do not offer these plans through our plans service, as Jan published them in a European magazine, but they are available from Nexus Publishing. You should be able to order a set from the North American distributor, Wise Owl Publications, 4314 West 238th St., Torrance, CA 90505-4509; (310) 375-6258; email: wiseowl@ sprintmail.com. LM

PILOT PROJECTS

A look at what our readers are doing

SEND IN YOUR SNAPSHOTS. ***Model Airplane News*** **is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.**

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

SUPER NICE

While vacationing in Alaska, Don Madison of San Diego, CA, went sightseeing in a full-size Super Cub. After taking some photos of the plane, he offered to build a model of it for his bush-pilot guide, and Don returned a year later with the 48-inch-span, foam-and-balsa model he holds in the photo. The little Super Cub uses a .40 engine and features automotive acrylic enamel paint and handmade numbers and trim panels.

FIRST SCRATCH PROJECT

Errol Winson of League City, TX, sent this photo of his first scratch project, a 124-inch-span de Havilland Mosquito he built from enlarged Bryan Taylor plans. The 55-pound plane is powered by a pair of Quadra .75s swinging 22x10, three-blade props and features custom-built landing gear from Unitrack. Errol writes, "Takeoffs are a beast, requiring every skill one can muster, but once in the air, it is really awesome ... [and] landings are a breeze."

1/4-SCALE GEE BEE

Roscoe Smith of Sun City West, AZ, used Henry Haffke plans to scratch-build this Gee Bee, which is dressed in Coverite with Krylon markings. The model is powered by a Zenoah G-62 with a custom exhaust system and weighs 21 pounds dry. Roscoe adds, "The static propeller is an exact replica of the Hamilton Standard [prop] used on the original R-1, and I made sketches of the actual prop at the Hamilton Standard factory in East Hartford, CT."

ZIROLI HELLCAT

Jim Meikle of Peekskill, NY, scratch-built this Hellcat from Nick Ziroli plans. The 84-inch-span, 27-pound model is powered by a G-62 engine and features Likes Line landing gear and a Robart tailwheel, and it's covered with Oracover.

1/6-SCALE S.E.5a

Jay Wiley of Oakland, ME, built this old Top Flite kit and added scale control surfaces for elevator and upper ailerons and functional pull/pull rudder control. A Williams Bros. Lewis & Vickers machine gun, Hangar 9 pilot bust and Major Decals markings dress up the plane. The 53-inch-span model weighs 6.5 pounds and uses a Saito FA-80 4-stroke for power.

HANSA-BRANDENBURG C.1

Jim Hooker of Festus, MO, used Willis Nye 3-views from the Air Age book, "Scale Aircraft Drawings, Vol. 1" to build this 1/6-scale Hansa-Brandenburg C.1, which is his first scratch-built project. With a wingspan of 78.5 inches, the C.1 weighs 10.5 pounds and is powered by a Magnum 1.08 engine swinging a 16x6 prop. It's covered with Super Coverite, is handpainted and has shock-absorbing landing gear. Jim writes that the C.1 has logged 14 problem-free flights to date.

50 YEARS AGO ...

Sal Taibi (left) designed the Pacer "C" in 1940, and Thomas Ryan (right) of Columbus, OH, built this one recently. The featured model is powered by a Shilen .29 engine and is covered with Brooklyn silk and Sig butyrate dope.

MESSERSCHMITT SLOPER

This 42-inch-span, power slope-scale Me 109G model was designed and built by David Engleson of St. Paul, MN. The foam-and-balsa profile ship has a 1-inch-thick fuselage and is finished with house-trim paint and hand-drawn insignia, and it has 2-channel control.

1/4-SCALE QUAIL

"The Aerosport Quail was designed in the early '70s as a homebuilt [kit] using a VW engine," writes Morris Cunningham of Greer, SC. Morris used the full-scale plans to build this 72-inch-span model, and he powers it with a .70 4-stroke engine. The Quail has nose-gear steering and flaps.

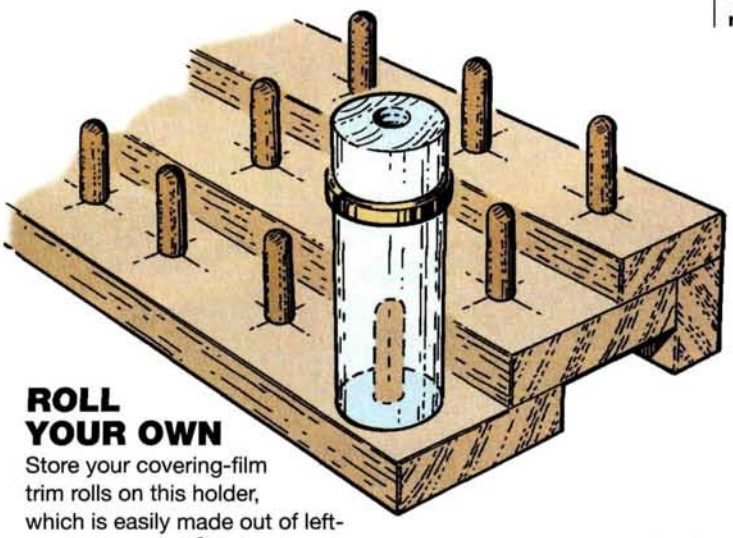
OLD KIT-NEW MODEL

The kit for this House of Balsa P-51 languished in Walt Wilson's workshop for 10 years until he decided to get back into R/C last year. Walt finished the model with 10-year-old Hobby Poxy and Perfect Paint, and he put a 20-year-old K&B .40 engine in its nose for power. Walt writes to us from St. Charles, MO.

HINTS & KINKS

BY JIM NEWMAN

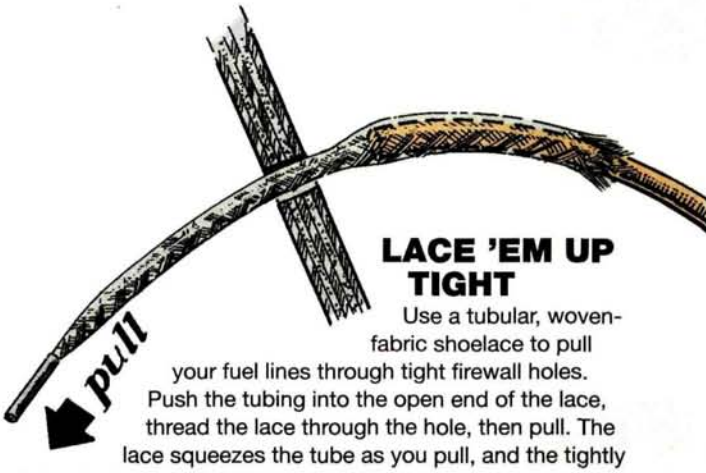
SEND IN YOUR IDEAS. Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



ROLL YOUR OWN

Store your covering-film trim rolls on this holder, which is easily made out of left-over lumber and 3/16-inch (5mm) dowel. It keeps the trim organized and minimizes damage to the leftover coils.

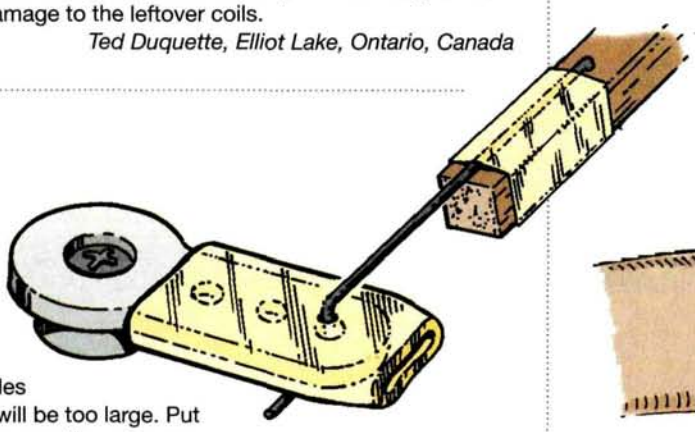
Ted Duquette, Elliot Lake, Ontario, Canada



LACE 'EM UP TIGHT

Use a tubular, woven-fabric shoelace to pull your fuel lines through tight firewall holes. Push the tubing into the open end of the lace, thread the lace through the hole, then pull. The lace squeezes the tube as you pull, and the tightly fitting fuel lines will then seal out oil.

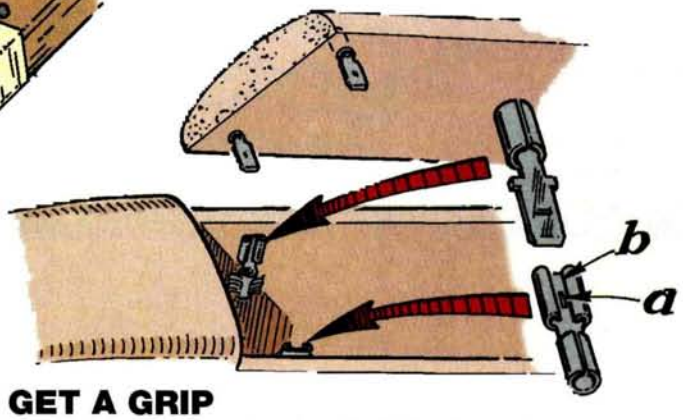
Kevin Pazda, Lakeland, FL



LITTLER HOLES

If your mini R/C model requires smaller pushrod wire than usual, the standard 0.062-inch-diameter holes in the servo arm will be too large. Put heat-shrink tubing over the servo arm, then bore a hole through it with the smaller pushrod wire.

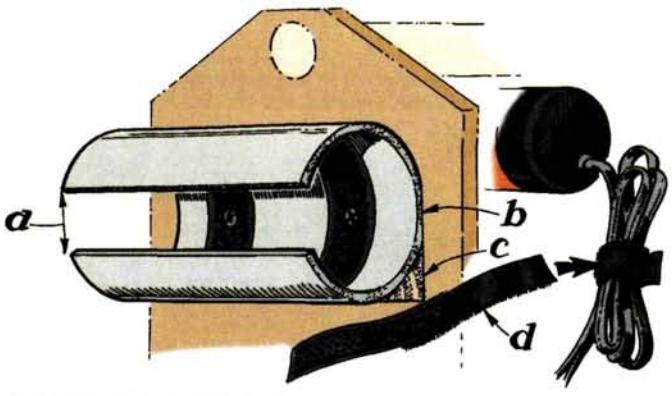
Jeff Hunter, Modesto, CA



GET A GRIP

Electrical spade connectors from RadioShack or auto-parts stores can be glued to the fuselage sides and into the canopy or hatch block, where they will firmly hold the canopy or hatch in position. Adjust the friction by punching down the pip (a) and prying open the rolled-over jaws (b).

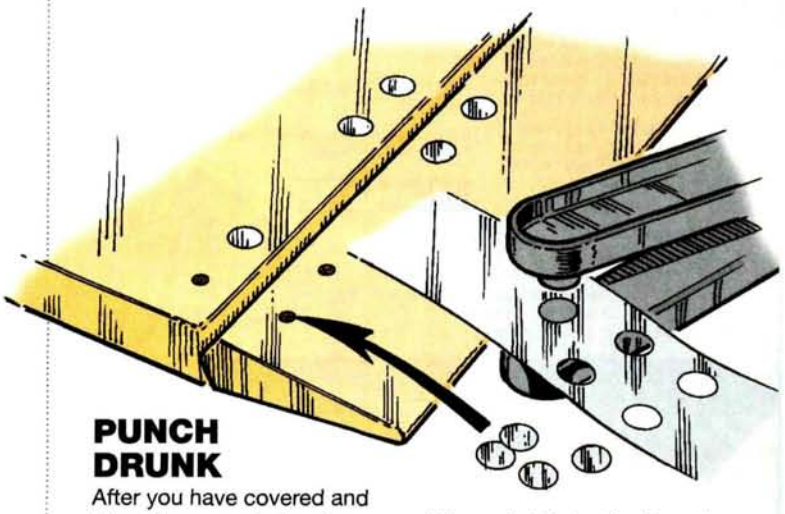
Don Baker, Aiken, SC



TUNNEL VISION

This tunnel will hold your starter motor and create more space in your box. Saw a 2-inch-wide (50mm) slot (a) down the side of a 3-inch-diameter (75mm) PVC pipe coupler, file a flat (b) on the back, glue on a wooden wedge (c), stick a Velcro®-brand fastener inside to provide friction, then screw the device to the end of your flight box. Slip your starter inside, then wrap the coiled power cord with a Velcro® strap (d).

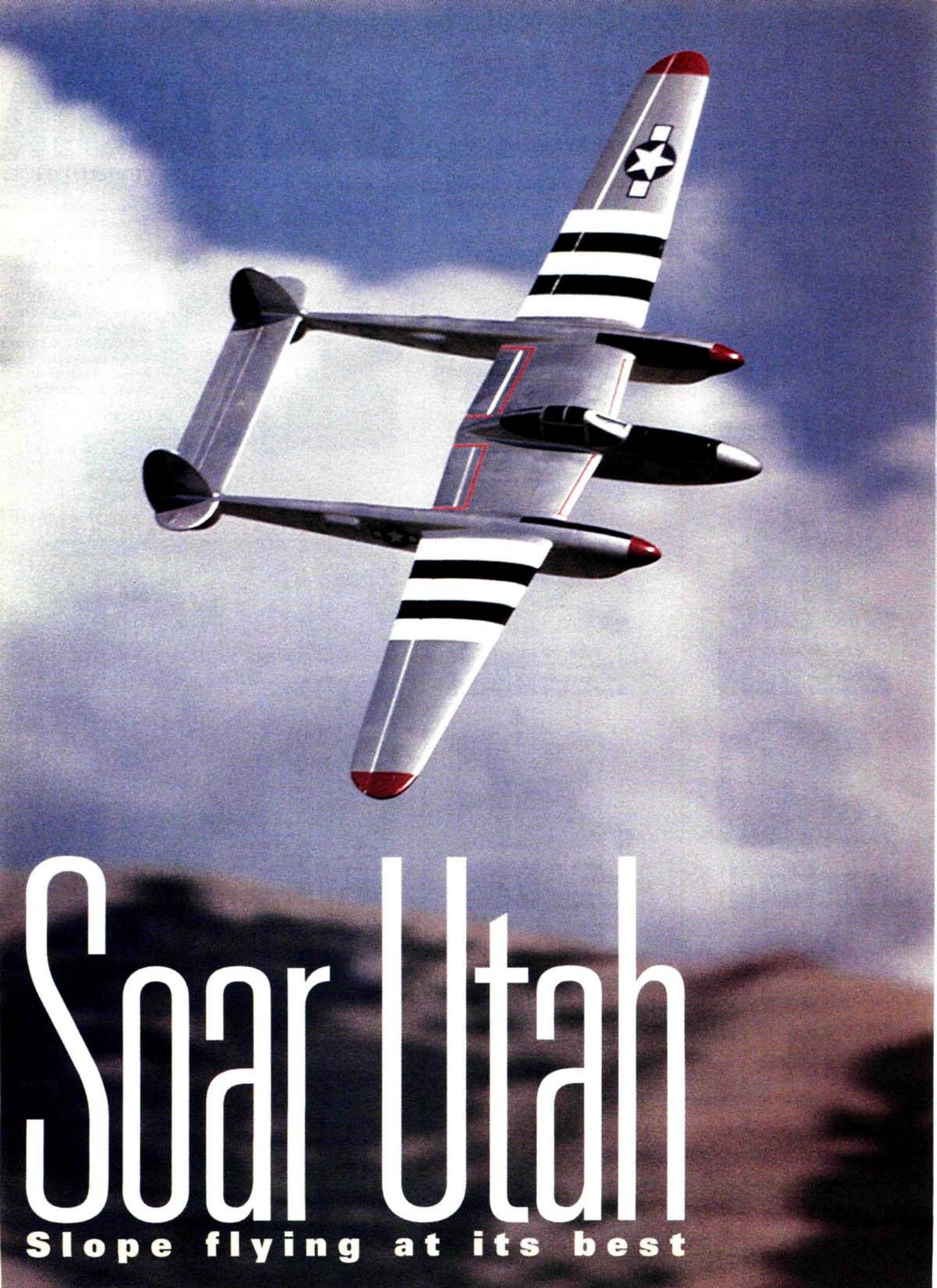
Paul Boucher, Rumford, RI



PUNCH DRUNK

After you have covered and hinged your control surfaces, seal the unsightly toothpick ends by ironing on punched-out discs of covering film.

Hovik Ghassemian, Glendale, CA


Soar Utah
Slope flying at its best

by Dave Garwood

PLANNED, PROMOTED AND presented by the Inter Mountain Silent Flyers (IMSF), the second Soar Utah event brought 45 pilots and about 200 sailplanes from 12 states to fly at three terrific slope sites near Salt Lake City, Utah, on September 5 to 7, 1998.

The Point of the Mountain (POTM) ridge (a sandbar formed in prehistoric Lake Bonneville) projects westward from the Wasatch range of the Rocky Mountains out onto the plateau between the Great Salt Lake to the north and Utah Lake to the south. The POTM itself, rising 400 feet above the valley floor, is flat and large enough on top to launch and fly thermal sailplanes from.

Francis Peak, a second flying site farther north in the Wasatch range, is "soarable" in west winds. The elevation of Francis Peak is 9,000 feet—nearly a mile higher than the Great Salt Lake at 4,000 feet—and offers an incredible view of the lake and the surrounding flatland. This is a big valley surrounded by big mountains; it's even big enough to make its own weather.

Left: Brian Laird's scratch-built Lockheed P-38 Lightning. Right: Brian Laird's super-detailed Boeing B-17 on a close pass. Below: Dave Sanders' scale-contest-winning, 5-meter-span CB-15 Crystal.

PHOTOS BY DAVE GARWOOD

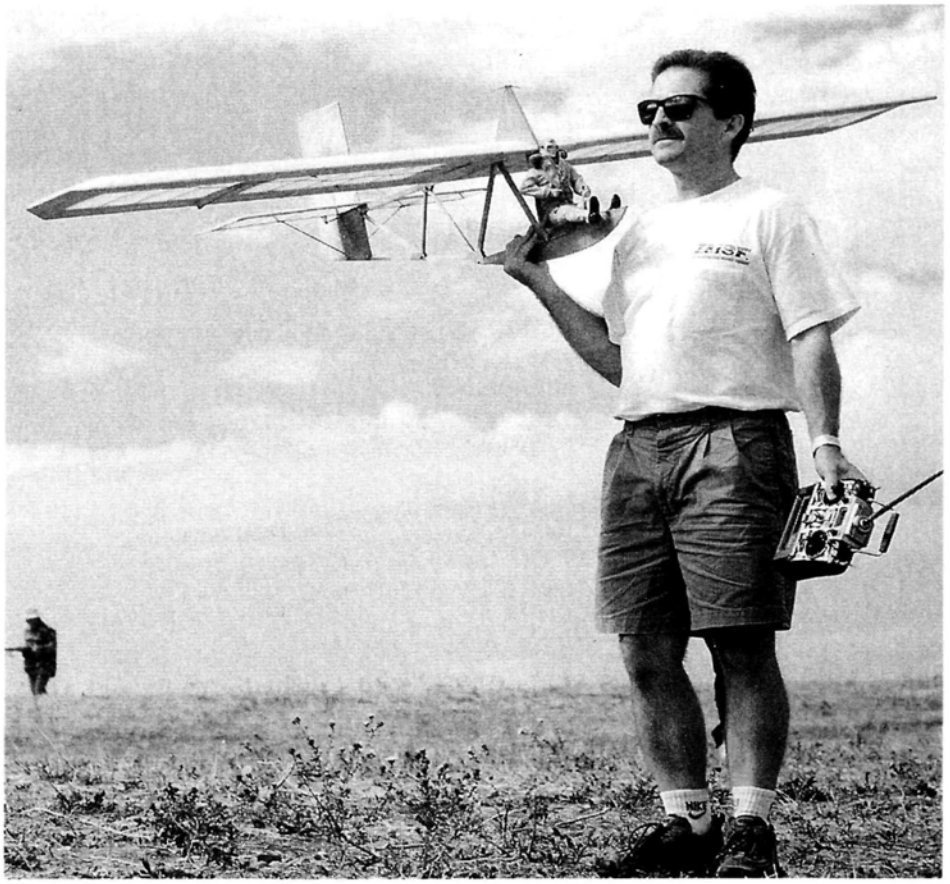
SOAR UTAH

THE EVENTS

Friday was a travel and warmup day—no formal events; just fly what you brought at POTM. We shared the ridge with hang gliders and parasailors in the morning and had the hill to ourselves in the afternoon. We had light but steady wind and saw CR Aircraft* Climmaxes, a Fred Mallet Epsilon, Slope Scale* warbirds and a few combat foamies take to the air.

In the late afternoon, the wind shifted and many fliers went over to the Salt Lake County Hang Gliding Park on the north side of POTM to share the north face with parasailors and hang gliders. Models in the air were HLGs, DAW* foamies, CR Climmaxes, Slope Scale warbirds and a Sig* Samurai. Several intrepid souls trekked up to the 1,000-foot ridge behind the flight park to fly in huge lift and cruise the upper ridge with parasailors. Models and man-carrying aircraft flew until dark.

Saturday dawned with steady, light to medium winds that increased throughout the day; this supported HLGs at first, then foamies and Tom Hoopes' vintage Northrop Primary Glider, then a few long-wing scale gliders like Dave Wenzlick's ¼-scale ASH-25, Dave Sanders' ¼-scale CB-15 Crystal and other glass slippers. Finally, heavy powered slope-scale (PSS) warbirds like Brian Laird's P-38 and B-17 and slope jets like

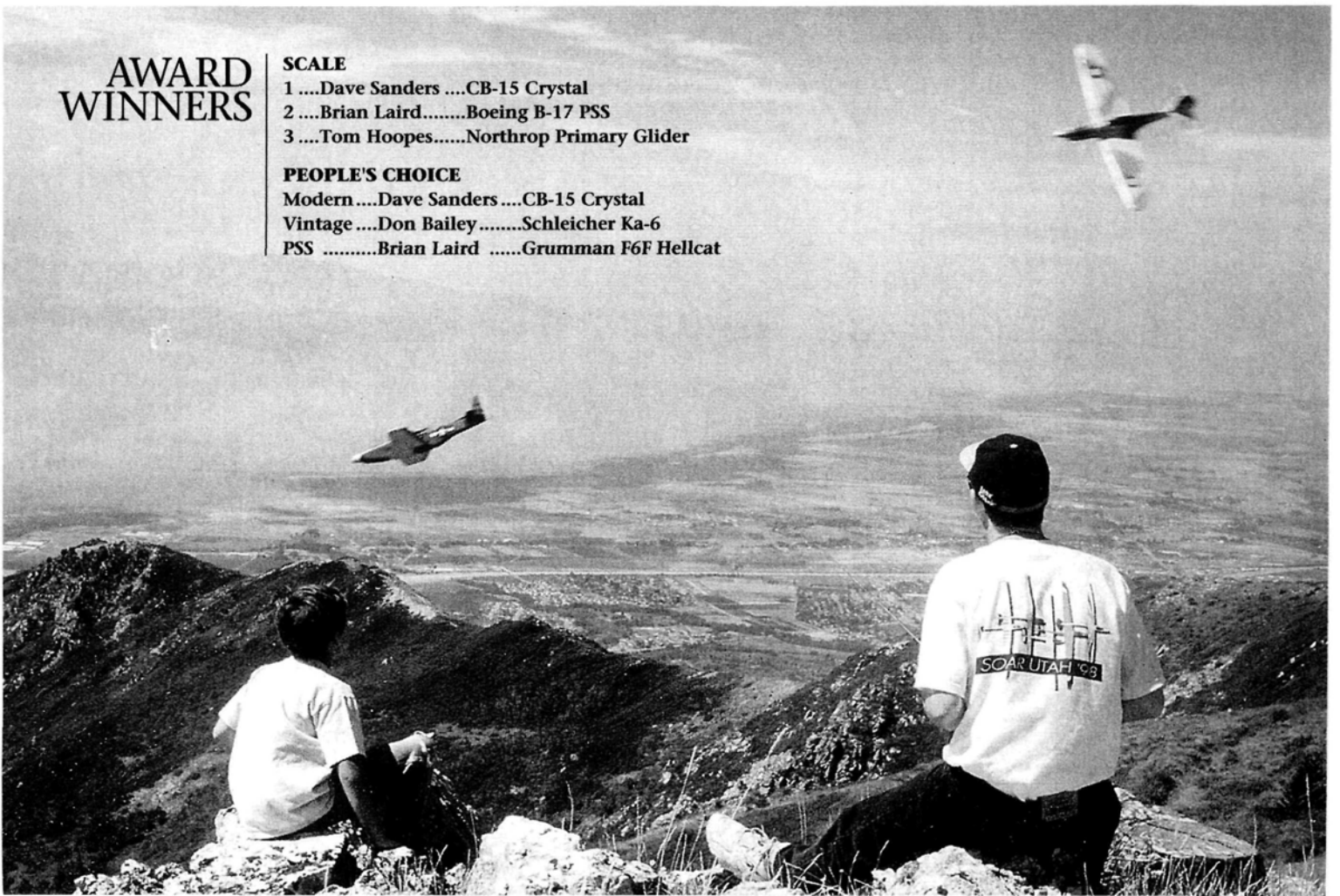


Above: contest director Tom Hoopes prepares to launch his scratch-built Northrop Primary Glider. Tom made five flights with this plane. Below: young Robert Aube watches Brian Laird chase Cliff Lindgren's Durable Aircraft Models P-51 Mustang with his Slope Scale P-40 Warhawk.

AWARD WINNERS

SCALE
1 ....Dave Sanders ....CB-15 Crystal
2 ....Brian Laird.....Boeing B-17 PSS
3 ....Tom Hoopes.....Northrop Primary Glider

PEOPLE'S CHOICE
Modern....Dave Sanders....CB-15 Crystal
Vintage....Don Bailey.....Schleicher Ka-6
PSS .....Brian Laird .....Grumman F6F Hellcat



Carl Maas' BD-5 and my BAe Hawk took to the air.

The scale flight judging was on Saturday and provided a real airshow for pilots and assembled onlookers. Judged flight scores were added to scale judging and pilots' votes to determine the scale winners.

Remarkable for their extremes in Saturday's flying were Dave Wenzlick's very small pivot-wing ASK-21, Tony Elliot's expansive 5-meter Duo Discus, Tom Hoopes' and Dave Sanders' adrenaline-filled bungee launches with combat foamies and Dave Nash's huge ¼-scale P-51 Mustang—a major-league crowd-pleaser.

On Saturday evening, we gathered at a town park for a lovely banquet, the static scale judging, presentation of awards, plus a boisterous and generous raffle.

Sunday morning gave us light winds and light rain. The conditions improved throughout the day, and in the afternoon, every type of plane from modern scale to vintage scale to PSS was flown. Sunday

Above: a crew prepares to launch Tony Elliot's Duo Discus at POTM.

Rich Loud warms up for foamie combat with his FoaMe-109.

afternoon saw more foamie combat, generally over a bowl-shaped gravel pit that made going down to retrieve a fallen plane a non-trivial task. When you start flying full-contact combat, it seems you can't get enough of it—regardless of the hazards of the venue!

On Monday, most fliers trekked to Francis Peak, 5,000 feet above the valley. Simply looking out from this place takes your breath away, and flying at such an alpine site is an unforgettable experience.

The morning presented light west wind, which rose to moderate lift in the afternoon. First to launch were light hand-launch gliders (HLGs) and Dale Pahl's Graupner Cirrus. Then came the foamies, including Cliff Lindgren's ¼-scale P-51 Mustang built from a Wade Kloos Durable Aircraft Models kit and Dave Wenzlick's ¼-scale scratch-built P-40 Warhawk. I flew a DAW 1-26 foamie, one of the most versatile planes in my arsenal. By noon, the lift began to support faster 60-inchers, notably Dave Reese's and Cliff Lindgren's matched CR Aircraft Climmaxes.

In late afternoon, we saw long-wing planes take to the air, including Mike Gibson's video-camera plane and Dave Wenzlick's ASH-25. On their fast passes, they made a noise that's usually heard only at an airport or on an aircraft carrier deck; it's the coolest sound in silent flight. Finally, the Slope Scale iron horses went up and thrilled those watching with the fastest and lowest of close passes. It was another day in paradise.

MEMORY NUGGETS

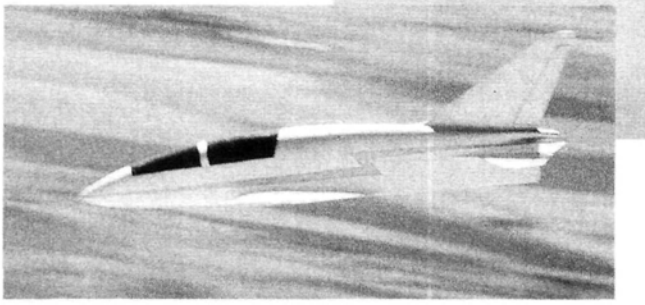
We witnessed unreal precision formation flying by Californian pilots Brian Laird, Carl Maas, Dave Reese and Joe Chovan, who repeatedly demonstrated amazing skill with very attractive and sometimes highly detailed PSS warbirds. These pilots commonly flew stall turns in formation with strong vertical development on both ends of the pattern. They occasionally tangled and went down together, but the Slope Scale planes are incredibly tough, and more often than not, they were picked up and relaunched. These pilots and planes combine to perform both an impressive aerial ballet and fast and furious high-speed passes—all while in close formation.

In contrast to the energy flying was Dale Pahl with his Graupner Cirrus. Dale built the graceful, long-wing sailplane 28 years ago while in high school and has re-covered it five times. Dale flew the Cirrus for hours in light lift both at POTM and Francis Peak, launching in light "HLG-type" lift, attaining great altitude, ranging far out and reminding us that the old birds can defy

gravity as well as, and sometimes better than, the latest and greatest wunderplanes. Watching Dale fly the Cirrus was the most relaxing activity of the trip for me.

Tom Hoopes set up a bungee (an all-rubber, no-line, high-start) to rocket-ship-launch his foam Me 163 and let others try launching. Dave Sanders joined in with a DAW Foam-51D and turned over the sticks to bystanders. If 100mph bungee launches don't get your heart rate up, nothing in sailplanes will!

Brian Laird and Carl Maas gave airbrushing and scale-detailing lessons showing how to weather a plane with gunsmoke trails, panel-line dirt and simulated "aluminum wear areas"; these really dress up a PSS warbird. Field airbrushing is a new "waiting for wind" activity for me.



Right: Carl Mass, one of the Hellcats over Utah crew, launches his Slope Scale Grumman F6F Hellcat at the POTM flying site (photo by Joe Chovan). Below: Carl Maas's BD-5 PSS slope jet on a close pass at POTM site.

Dave Nash's giant-scale planes make a lasting impression. His ¼-scale, 9.5-foot-span P-51 Mustang has a foam wing covered with sheet balsa, and its fiberglass fuselage, stabs, fin and rudder require 22 molds. His ⅓-scale MiG 15 of similar construction takes six molds. Also impressive is his new ½-scale ASW-20 fuselage. Dave's company, Glasco Aircraft*, makes 11 kits.

Dale Taylor's full-scale, fabric-covered Schleicher Ka-8 on display, flanked by Don Bailey's Ka-8 and Mike Lance's Ka-6 R/C models, made a great visual impact. Dale's big plane reminded us of a nostalgic period in glider development and provided a benchmark with which to compare the scale models.

Tom Hoopes scratch-built an 80-inch-span Northrop Primary Glider, vintage 1940, scaled to fit a G.I. Joe pilot. The model was built up out of spruce and ash, covered with Super Shrink Coverite and antiqued with cherry and walnut stain to look like the original muslin. Tom threw it off the hill with abandon, flying it almost as though it were a foamie. It was one of my favorite planes of the meet.

Combat over the gravel pit at POTM added an additional penalty for those who were defeated in air combat: descending a slippery slope and struggling back up with the downed plane. I think full-contact combat with these specialized, bounceable EPP-foam planes is here to stay; it generates maximum excitement in both pilots and observers. (For more information on these planes and a new branch of our sport, see my article, "Slope Combat" in the July 1997 issue of *Model Airplane News*.)

The Hellcats Over Utah members (two Californians and two New Yorkers) all built a Slope Scale model of the Grumman F6F Hellcat and painted them as squadron mates. As Brian Laird, Carl Maas, Rich Loud and I launched the four nearly identical planes to fly in formation, one pilot was heard to mutter, "This is going to end in disaster," in reference to the difficulty of keeping track of your own plane in the pack.

A few pilots stayed over on Tuesday and flew on the day following the event, and I think we had the best wind of the week. For those traveling from a significant distance, scheduling an extra day or two on site before and after an event increases the chances of having wind to fly in. It worked for us on this trip.

Ground crew prepares to launch Dave Nash's ¼-scale P-51 Mustang. Dave Nash in white shirt, back to camera; Tom Hoopes on the transmitter (photo by Shelby Sanders).

WAITING FOR NEXT TIME

Soar Utah '98 was mainly an informal slope-flying event for those who love scale and PSS, with a trace of competition thrown in to provide a focus. The Inter Mountain Silent Flyers did a first-rate job of planning and staging the event and seem to have a gift of averting the "range wars" that often occur between the ranchers and the sheep-herders of R/C soaring: long-wing scale fliers and PSS fliers. I'll be happy to see a third Soar Utah, and I hope it's not long in coming.

To see more photos from the event and to find out when the next Soar Utah is coming, check the www.soarwest.com website.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

A sweet flying sport plane from Thunder Tiger

THUNDER TIGER

Tiger Sport 40L

by Craig Trachten

"It's Grrrrrrreat" to quote Tony. The Thunder Tiger® Tiger Sport 40L has to be one of the best low-wing trainers I have come across. Do not stop reading because the term "trainer" was employed; it's much more than a trainer and will be enjoyed by the most proficient flyer. It is as docile as any trainer on the market but as agile as most sport planes and will be enjoyable to fly by everyone.

Step one of any kit is to open the box, look through it and then *read* the instruction manual. The documentation is typical Thunder Tiger—excellent! The first few pages show each parts bag and what's in it and which tools and supplies are required to complete the kit. There is even a section with pre-assembly notes. Construction instructions do not begin until page 6. Take your time, read the directions and look at the excellent construction photos, and you will have absolutely no problem completing this aircraft.

• **Wing assembly.** Start by epoxying the three dihedral/wing-joiner brace pieces together. Pictured are three butterfly paper clips being used as clamps while the epoxy is drying. This is also where my wife loses her clothespins, as anything that will hold the pieces together while drying will do.

Measure and cut out the opening for the aileron servo on each wing half. Laminate the four center rib pieces together to form two, ¼-inch plates. By now, the wing brace will be dry, so you can test-fit it into the wing halves. Make sure it goes in all the way without binding. I sand this type of brace to where it is almost too loose; I do this so that when it is epoxied into place, not all the epoxy is squeezed out. All this means is that I have to make sure the wing halves are braced

while they're drying so there isn't any shifting. Epoxy the center brace into one half of the wing and then into the center rib. The center rib should match the lines of the wing; if it is slightly over or under, position the center rib so that it is flush with the *bottom* of the wing.

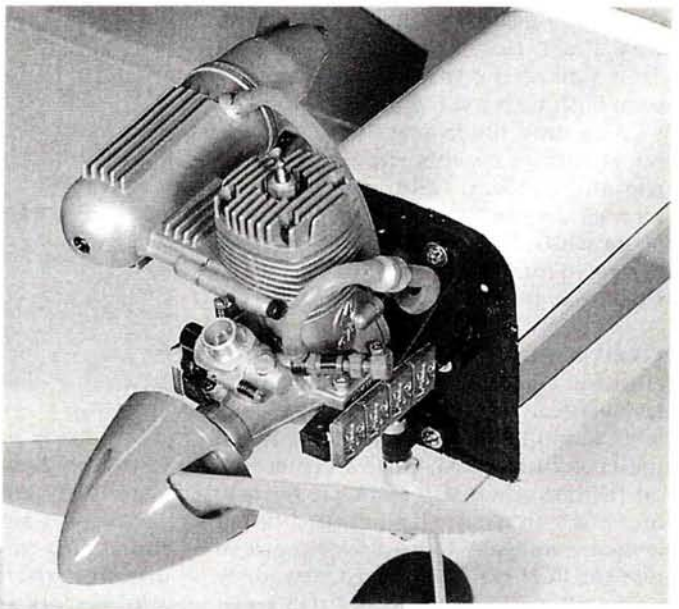
When the glue has dried, epoxy the two wing halves together, making sure they are taped and braced so they will not shift while drying. Before you tape and brace the wing halves, clean off any epoxy "ooze"; rubbing alcohol works well for this. *Builder's tip:* I use two-hour epoxy to join the wings. I am never in a rush, and two-hour epoxy has its advantages: it affords me plenty of work time, and it is thinner than 30-minute epoxy, so it flows down more easily into the brace slot; and, as with *all* adhesives, the longer the cure time, the stronger the bond.

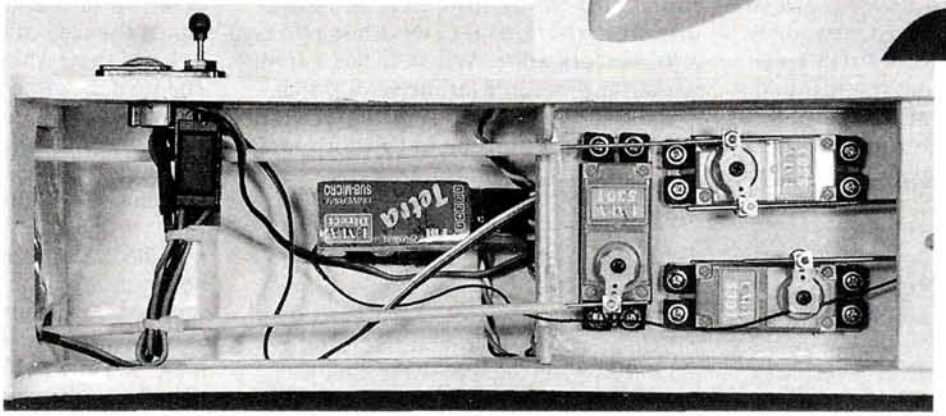
Back to the building. Assemble the aileron servo tray; I used Zap* CA Gel for this. Apply the white trim tape (supplied) to give the wing a nice finished look. CA-gel the plastic wing protector into place, and you're then ready for the final wing construction: aileron installation. First, I took my hobby knife and trimmed off any covering material that was in the way of the hinge hole, then I applied a light oil to the hinge area.

With all the prep work out of the way, I mixed up a batch of two-hour epoxy. Using a toothpick, I placed a drop of it into each hole, then I went back to hole one and started over. After my third epoxy pass, each hole was about half full of epoxy. Perfect! There was enough goo in there to firmly secure each hinge, but not so much that it oozed all over the place. While the epoxy was still wet, I attached the aileron and wing. Every few minutes, I moved the aileron up and down. This served two purposes: it made sure the hinge moved freely, and it helped align each hinge point so I would not experience any binding caused by hinge-point misalignment. When the epoxy had dried, I repeated this process for the other side.

Remove the covering material over the factory-installed landing-gear blocks, and insert the two landing-gear wires. Pilot-drill the holes for the landing-gear straps (two each side), then fasten the straps into place. Put the wheel on the wire, tighten down the wheel collar and you've finished!

• **Wing mounting.** Start by putting a center mark on the fuselage just behind the wing opening. Next, the instructions ask you to mark the center of the wing mounting plate. *Builder's tip:* I measured in from each aileron opening to find the mounting plate center point. This ensures you mark the exact center of the wing. Put the wing into place, lining up both center marks. Drill a 5/32-inch hole through the wing and the wing-mounting block inside the fuse. The hole you drill should be perpendicular to the wing-mounting block inside the fuse, *not perpendicular to the bottom of the wing.* Remove the wing, open the hole in the block with a 3/16-inch bit and insert the blind nut. Put a washer onto the wing bolt, insert the bolt through the wing, and then place an O-ring over the bolt. The O-ring will help you avoid losing the wing bolt; I do this on all my aircraft.





Above: the engine installation is typical, and the Thunder Tiger .42 nestles in front of the firewall nicely. Note that I had to add a little lead to the nose to get the correct balance. Left: it's easy to install the radio gear because there's plenty of room to work inside the fuselage.

• **Engine and cowl.** Mounting the engine is no different from mounting the engine in any other kit on the market that uses a two-piece adjustable mount; the cowl, however, is a different story. The cowl I received with this kit had a problem: it did not fit. I spoke to the products manager at Thunder Tiger and found he was already aware of it; he assured me that the problem would be fixed by the time this review is published. If you happen to have one of the bad cowls, call Thunder Tiger, and the folks there will be more than happy to send out a replacement.

SPECIFICATIONS

Manufacturer: Thunder Tiger

Model name: Tiger Sport 40L

Model type: low-wing sport

Length: 43 in.

Wingspan: 56 in.

Wing area: 542 sq. in.

Weight: 5 lb., 8 oz.

Wing loading: 23.4 oz./sq.ft.

Engine req'd: .40 to .46 2-stroke

Engine used: Thunder Tiger GP .42

Props: Master Airscrew* 10x6, 10x7

No. of channels req'd: 4

Radio used: Futaba 8UAP w/ FMA Direct receiver and servos

Fuel: Morgan* Omega 15% nitro

List price: $165.99

Features: good-looking; perfect aerobatic trainer; quick build; semisymmetrical wing; two-piece ABS cowl.

Comments: the Tiger Sport 40L is a great-looking, great flying aircraft that will give you hours of enjoyment with minimum effort.

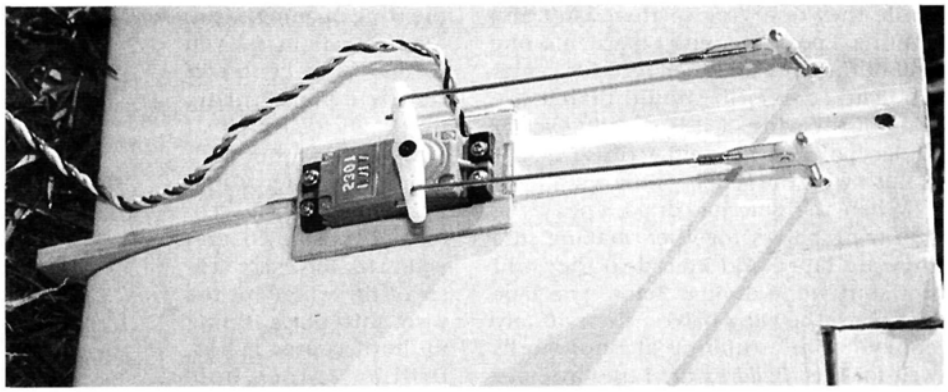
Hits
- Good-looking.
- Quick and easy to build.
- Flies great.
- Excellent $-to-fun ratio.

Misses
- Problems with cowl; will be fixed by manufacturer.

PHOTOS BY GERRY YARRISH

THUNDER TIGER TIGER SPORT 40L

Under a deadline, I had to work with what I had. First, I trimmed the tabs on each side of the fuselage so that they were flush with the top turtle deck. Next, I CA'ed only the front of the cowl and put it into place; this left a gap on the top and bottom. Ignoring the gap, I screwed the cowl into its proper position. Some white, self-adhesive trim covered the gap. From 2 feet away, you can't tell what I had to do to make the cowl fit.



Aileron servo installation is typical.

• **Tail feathers.** Start by epoxying the elevator and rudder to the horizontal and vertical stabilizers. I used the same method as I had with the ailerons. When the epoxy has cured, draw a center line on the horizontal stab and slide the stab into place on the fuselage, making sure it is square and true. Using a felt-tip pen so that the lines can be removed later, draw a line where the fuselage and stab meet. Then remove the stab from the fuse and, using a hobby knife, remove the covering material between the four lines you just drew. Because I use a broad-tip pen, I cut ⅛ inch inside the lines.

Now you are ready to epoxy the horizontal stab to the fuse. Here is another instance where using two-hour epoxy affords work time. When it has cured, repeat the procedure for the vertical stab.

Builder's tip: I make sure the vertical stab stays perpendicular to the horizontal stab by running a piece of masking tape from one tip of the horizontal stab over the tip of the vertical stab and to the other tip of the horizontal stab. Before I attach the tape to the vertical stab firmly, I check their alignment with a square. The final step to complete the tail-feather construction is to install the pushrods and control horns. Just follow the manual. This also holds true for the aileron servo/pushrod installation.

• **Radio installation.** Here again, there is no magic. You can successfully follow the supplied documentation and end up with excellent results. I use a programmable radio—a Futaba* 8UAP—so at this point, I do not concern myself with servo throw. I just make sure all the servos are in the neutral position before I start. I also prefer "arms" over "wheels" on my servos. At my final setup, I adjust my high and low rates and throttle throw using ATV.

• **Canopy.** Trim the canopy along the mold line. A pair of curved Lexan scissors—primarily used to trim R/C car bodies—is helpful here; I clean up the cuts with my motor-tool with drum sander. The instructions call for CA to attach the canopy to the aircraft, but I use servo-mounting screws to hold my canopies. The screws allow me to remove the canopy if need be, without damaging the fuselage.

• **Final construction.** Install the spinner and prop, apply the finishing stickers to the cowl, and you've just about finished. Next, check your control-surface deflection. The rudder should move ¾ inch in each direction; I used this for my high rate, and ½ inch was my low-rate deflection. The aileron and elevator deflection should be ⅜ inch; ¼ inch was my low rate.

The last thing to check before you go flying is the CG; balance the aircraft upside-down. The CG is 3 inches behind the wing LE. To achieve the proper CG, I just had to move the receiver battery.

FLIGHT PERFORMANCE

by Larry Marshall

Craig couldn't go out with us on the day we were going to shoot photos of the Tiger 40L, so he gave me the plane and said "Have fun." As it turned out, Gerry Yarrish, Rick Bell and I did just that, as this plane was really a sweet flyer.

• TAKEOFF AND LANDING

We were flying from a grass runway with somewhat rolling terrain. In spite of this, the Tiger Sport made me look good when I pointed it down the runway, as it just ran as straight as a die prior to liftoff. I did end up dialing in a bit of aileron trim as it climbed for altitude, but takeoff was a non-event.

Landings, on the other hand, were quite the event, as we were all excited at how this .40-size plane would hug the ground once it touched down. All three of us flew this plane, and our favorite thing was to shoot touch-and-go's, letting the plane roll 100 feet or more before lifting off for another circuit.

• LOW-SPEED PERFORMANCE

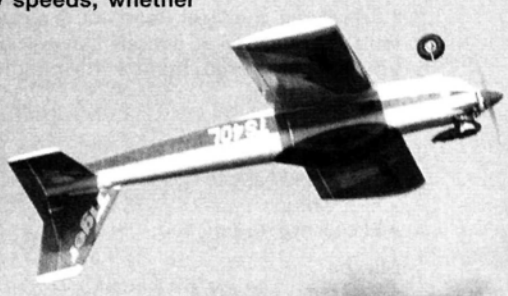
This plane maintains very good control at low speeds, whether upright or inverted. I was surprised by the aileron authority at low speeds. On approach, the plane seemed to drop in without any required control inputs, with no tendency to drop a wing. In fact, when I tried, I found it really hard to stall this airplane.

• HIGH-SPEED PERFORMANCE

This is not a pylon racer. With the Thunder Tiger .42, I guess its top speed to be around 60mph—more than enough for a sport plane. There are no surprises at full throttle. As you'd expect, control authority is increased, but the plane continues to go where you point it.

• AEROBATICS

This plane seems capable of just about anything you want. I did have a bit of trouble holding knife-edge for extended periods, but it will roll and loop with the best of them. Slow rolls were satisfactory and, of course, it would spin, fly Cubans, inverted, stall turns, etc. By the end of our flying session, I was confident enough in the plane's abilities to do low inverted passes down the runway—something I'm not inclined to do with other people's airplanes; but the Tiger 40L was up to the task, and I'd recommend it to anyone.



Addresses are listed alphabetically in the Index of Manufacturers on page 134.

19th ANNUAL KRC Electric Fun Fly

by GERRY YARRISH

Being casually interested in electric-powered models, I've dabbled with motors, speed controllers and batteries for several years. It wasn't until recently, however, that I got seriously involved in the sport and decided it was time to attend the KRC Electric Fun Fly in Allentown, PA.

Put on by the Keystone Radio Control Club of eastern Pennsylvania, KRC '98 was the 19th annual gathering. Being the typical enthusiastic first-timer, I found the event a great treasure trove of technical information and experience to take advantage of. KRC is not just a model meet; no, it's much more than that. KRC is a showcase where you can see first-hand the newest and greatest things in electric flight. The event is also a wonderful opportunity to meet and speak with the people who make electric flight so appealing. The most widely known electric meet, KRC has something for everyone from the super simple to the seriously big and scale.

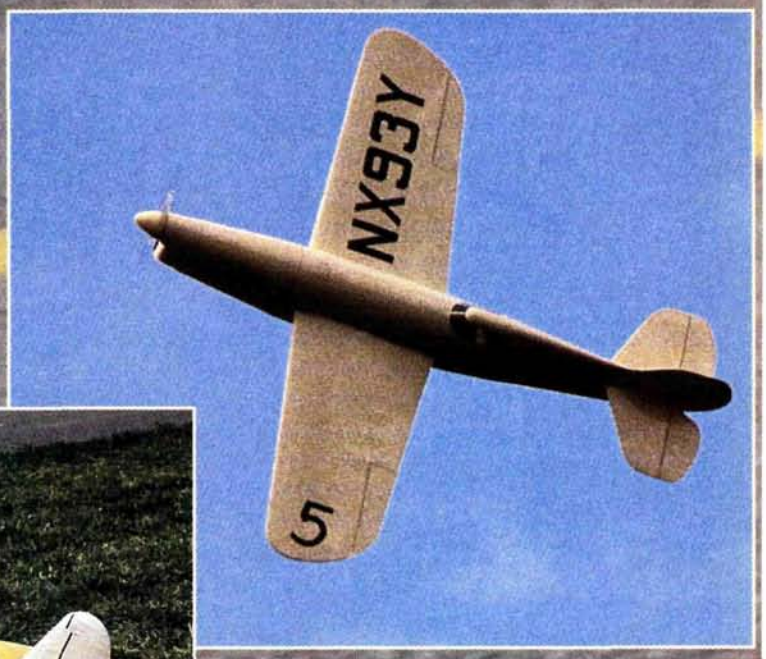
Inside Dave Grife's Elextra 300 is this familiar fellow—a dolled-up William Bros. pilot that looks like Keith Shaw!

Dave Grife's scratch-built Huges H-1 Racer has a span of 65 inches and is powered by an Astro 40 coupled to a Super Box. Dave followed Paul Matt drawings to build his impressive racer.

PHOTOS BY GERRY YARRISH & LARRY MARSHALL

A good place to sit back and Enjoy!

Main image: Keith Shaw's old faithful Super Stearman flew with precision and grace. Keith is one of the pioneers of electric flight.



Above and right: Keith Shaw flew this unusual Art Chester Goon Golden Age racer with retracts. Left: Bill Wargo's impressively large V-173 Flying Flapjack added interest to the flightline, but it was not ready to fly.

A lesson in stealth, Keith Shaw's multi-motor flying wing presents very little frontal area to see or to create drag. This model has been flying for many years.

Dave Grife's Hawker Hurricane comes in for a landing—very realistic.

IT'S SHOWTIME!

As is usual with most well-established meets, KRC has an impressive noontime show. Flightline central was occupied by well-known E-fliers, Keith Shaw and Dave Grife. Keith and Dave must practice a lot, as most of the time, these guys flew their models in close formation. Between these two master modelers nearly every aspect of aviation was represented. From WW I and WW II biplanes and fighters to Golden Age racers and modern unlimited aerobatic planes, Dave and Keith carved up the sky with beautifully detailed scale models. The dual flying demos ended with impressive flights of Dave's Hughes H-1 Racer and Keith's retract-equipped Art Chester Goon.

Next, separate solo demos included Keith's 81-inch-span Grumman F8F Bearcat and his veteran Stearman biplane and Dave's Travel Air Mystery Ship and his Elextra 300 (a converted Midwest Extra 300 kit).

What most struck me as different about KRC was its local, down-at-the-flying-field mood. Yes, there is a flightline full of people waiting to fly, and yes, there is a registration tent and a radio impound, but the mood is seriously laid-back. I like laid-back! Besides the flying, and there's plenty of opportunity for you to commit aviation, there's a whole lot of relaxation going on; plenty of sitting around with friends and talking about flying. I had ample opportunity to do both on this, my first time out, and I want to repeat the experience.

For the diehards at KRC, the event starts just after sunrise, and the flying stops only when you can't see your model for the darkness.

Two things were evident: ducted-fan models and microlight, slow flyers are becoming very popular. Several of each type were scattered about the flightline and pit areas, and it seems to me that given the equipment that's available today, you can be very successful with either.

Best of Class Award Winners

Junior Modeler
1. Kurt Settembre
2. Justin Wolf
3. Sam Foss

Multi-Motor
1. Bill Wargo, V-173 Flying Flapjack
2. Scott Black, Pond Racer
3. Chris True, Sorcerer

Multi-Wing
1. Dave Grife, Fokker D-VII
2. Don Bosquet, Four-of-a-Kind
3. Martin Ervine, Hawker Fury

Scale
1. Dave Grife, Fokker D-VII
2. Gerhardt Spielmann, Fiesler Storch
3. Martin Ervine, Hawker Fury

Speed 400
1. Don Belfort, Blohm & Voss 141
2. Art Cangialosi, Peerless Panther
3. Bob Armington, Shrike

Sport-Scale
1. Keith Mey, J-3 Piper Cub
2. Dave Rieco, Icarus Heli
3. Chris McHugh, Waco Cabin

Technical Effort
1. Gerhardt Spielmann, Fiesler Storch
2. Robert Wagner, A-10 Warthog
3. Keith Shaw, Fokker D-VIII

Vintage
1. Colin McKinley, deBolt Champ
2. Art Thomas, Custom Privateer

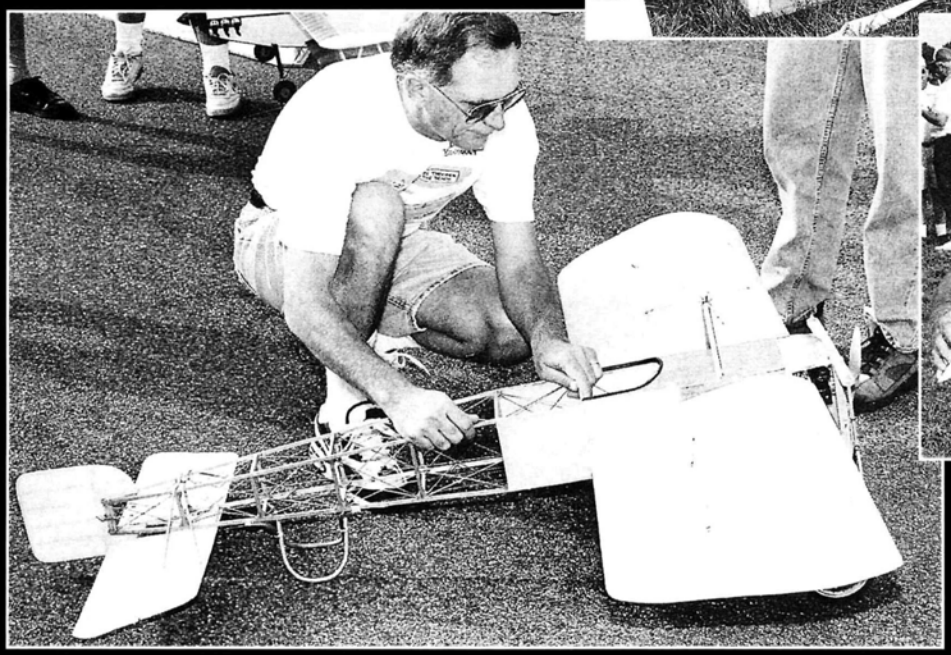
All up, last down
1. Karl Benson—2 hours, 10 minutes, 18 seconds
2. Cliff Schaible—2 hours, 3 minutes, 33 seconds
3. James Adversalo—1 hour, 43 minutes, 44 seconds
4. John McCullough—1 hour, 17 minutes, 5 seconds

Biggest Model—Jerry Smart, Miss Philly (15-ft. span)
Smallest Model—Pat Mattes, Delta Wing
Control Line —Joe Pasquito,Sig Twister
CD Choice—David Elias, Bleriot
First Time at KRC—Peter Voss
Solar-Powered—Todd Heimer, Simple

Dave Grife's scratch-built, 1/4-scale, Fokker D-VII is powered by an Astro FAI 60 motor on 36 cells; the WW I fighter was awesome in the air.

19TH ANNUAL KRC ELECTRIC FUN FLY

Above: now, here's an impressive electric conversion—a Top Flight vee-tail Bonanza powered by a MaxCim motor. Far left: Jim Ryan of Ryan Aircraft talks to an E-friend about his Speed 400 Bearcat. Jim really should be given a "Friendly" award! Left: Marc Thompson assembles his beautiful CL-415 Canadair. Marc is an excellent pilot, and he flew the dickens out of his twin-engine fire bomber; power comes from a pair of Astro geared 05s.



Above: Hobby Lobby's Jim Martin prepares his Vari-Eze for another flight. The 56-inch-span model has a gelcoated fiberglass fuselage and obechi-covered foam wings and canard. Left: David Elias preps his Bleriot monoplane for another flight. Built from a 3 Sea Bees ARF kit, the model featured wing-warping control.

SPONSORS

Aerospace Composite Products
Air Age Publishing
Airtronics
Animated Objects Inc.
Applied Design Corp.
AstroFlight Inc.
Aveox
Balsa USA
Bill Griggs Models
Bob Holman Plans
Bob Smith Industries
Carstens Publications
Castle Creations
Chapis Plans
Electronic Model Systems
FMA Direct
Futaba Corp.
HiLine
Institute of Silent Flight
JR Radio/Horizon Hobby Distributors Inc.
Kress Jets
Model Electronics Corp.
Modelair-Tech
New Creations
Northeast Screen Graphics
Omni Models
Peck-Polymers
Penn Valley Hobby Center
Radio Controlled Models Inc. (RAM)
R/C Modeler magazine
Rocket City Specialties
Sailplane & Electric Modeler Magazine
Satellite City
Scale Model Research
Sig Mfg. Co.
Spirit of Yesteryear
SR Batteries
Stitzer Models
SureFlite
Tower Hobbies
Unbéaten Path Imports
Viper Model Products
Windsor Propeller Co.
Z-Tron
ZZ Enterprises Inc.

VENDORS' ROW

KRC also has a very healthy supply of E-vendors and most everyone was there. Bob Boucher of AstroFlight* was constantly surrounded by modelers looking for goodies. New this time was his 215D digital speed controller. This small unit has BEC, was designed for 6 to 10 cells and can handle 30 amps.

One of my favorite people is Jim Martin of Hobby Lobby*, and I had several chances to speak with him and to see what's new. Though he was constantly on the flightline with transmitter in hand and neck craned back, Jim did take the time to show me his cute little 35-inch-span, Speed 400-powered Wingo. This pusher parasol design has a foam wing and tail and is super-easy to build and fly. The Wingo also comes with the motor prewired and weighs in at about 20 ounces. At the other end of the performance spectrum, Jim showed a Speed 400-powered B-25 Mitchell bomber and a British Mosquito.

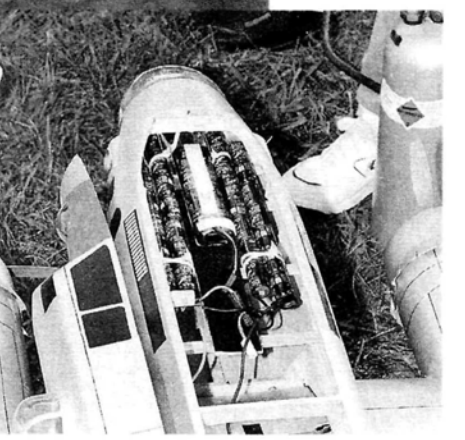
Marc Thompson flew this kind of Round Tuit model built entirely of pink foam. Powered by a Speed 400 motor, the Pinky Foamie uses elevons for control.

I also bumped into Bob Hunt of Modelair-Tech as well as Bill Griggs and the folks at Northeast Sailplane, all of whom were busy changing dollars into electric flight dreams. Several other electric vendors made up the flightline center, and if you had a mind to buy something, the sky was indeed the limit.

ON THE FLIGHTLINE

The best parts of any event, of course, are the pilots and their models. It's great to see in person the people and models you already know through model magazines and videos. The biggest warbird had to be Dave Baron's B-17 Flying Fortress. Dave has flown this monster for a few years now, having bought it from its builder, Joe Beshar. Dave removed the original fixed gear and installed retracts in the Don Smith-designed bomber.

Dave Baron flew several bombing runs with his impressive B-17 Flying Fortress. Built by Joe Beshar, the bomber now sports retracts.



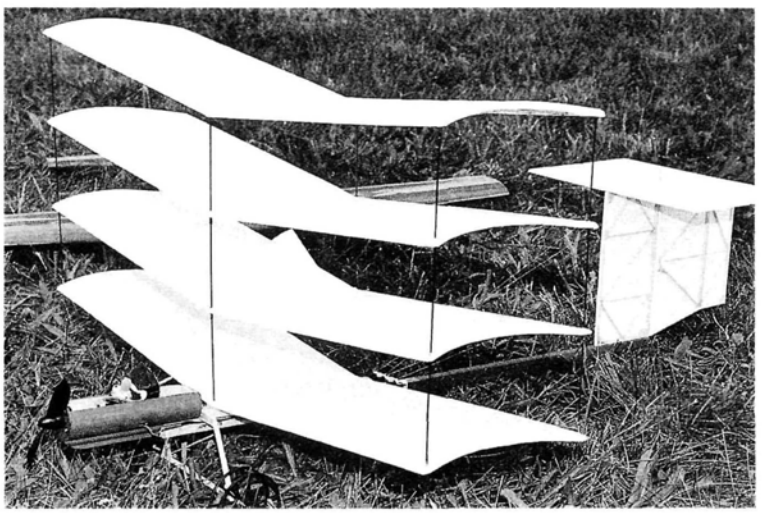
At the other end of the warbird-size scale are Jim Ryan's Speed 400-powered fighters. Several of Jim's designs, including his P-38 Lightning, Grumman Hellcat and Bearcat, were flown by various modelers. Each of these models is available in plan form from *Model Airplane News*, and Ryan Aircraft* also offers laser-cut kits for these impressive little fighters. Be warned, however, that if you do build and fly one of these babies, you may be hooked forever!

"Current Thoughts" columnist Greg Gimlick showed up with a van filled with glow-to-electric conversions. Greg flew a Rich Uravitch-designed OV-10 Bronco (powered by a pair of Astro geared 05s) as well as a Sig* LT-25 (powered by a MaxCim brushless motor). Greg is always coming up with easy-to-convert designs, and this certainly simplifies getting into the E-hobby.

If ducted fans turn your switch on, then get in line and check out the Kyosho* T-33. Made of molded foam and plastic, this jet flies very well on its stock motor/fan setup. A few people have installed more powerful motors, and the performance increase is very noticeable. No less than eight T-33s were at KRC, and late on Saturday, there was a mass launch—pretty impressive to see so many jets in the air all at once. The photos tell the rest of the story about who had what, and I am glad I took along something to fly as well as my camera. KRC is a place you want to fly.

If there is a downside to the KRC experience, I'd have to get just a little bit picky and say that the distance from my pit area and tent to the flightline was on the long side. The meet is held at the Queen City airport, and the flying takes place on a section of runway. This makes for a nice paved surface to take off from and land on, but it does make landing gear a requirement. Several modelers flew small, Speed 400-powered models and these were hand-launched and landed in the rough grass on the far side of the paved surface. Other than these minor points, I had a great time and enjoyed myself immensely.

KRC is held on the third weekend in September, so there's plenty of time for you to make plans for '99. See ya there! For more information, check out the KRC website: www.krc.org/1998krc.htm.



This quad-wing, T-tail creation is the work of Don Bousquet. The "Four-of-a-Kind" is powered by a geared Speed 300 motor and a 600mAh 6-cell pack.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

RARELY DOES a new product look so well suited to novice R/C flyers, but Hobby Lobby's* Wingo just may be the *best* "first R/C aircraft" to hit the market in recent history. At $119, it is as low in cost (in the ARF category) as it is easy to build and fly, yet this unusual aircraft is not just for beginners. The Wingo represents a unique convergence of materials, design, price and flight attributes that adds up to just plain fun for experienced modelers as well.

Hobby Lobby WINGO

by Tom Atwood

Hobby Lobby offers the Wingo as part of a turnkey package that includes an 8-cell 500mAh battery, an LRP charger, Speed 400 motor, all building accessories and Hitec Focus 3 radio. It has everything beginners need and can be assembled in under three hours (most of the time is spent waiting for the 5-minute epoxy to set).

The Wingo goes together simply and fast. There's one way to build it, and only one way. Except for tightening the keepers that keep the wheels in position and tightening down the servo arms, there are no screws to turn. There is no covering material to apply, no hinge slots to cut and no thrust angles to finesse, and all the parts fit together in a logical, straightforward manner.

Hobby Lobby calls this plane a "park flyer." It weighs only 20 ounces fully configured and has a wing loading of only 7.2 ounces per square foot. Intended for relatively calm air, it can fly very slowly, and it performs well in a small area; in fact, we're considering holding Wingo pylon races in a local basketball gym.

The small Speed 400 motor is mounted in a direct-drive, pusher configuration and is held in place on balsa rails by a single rubber band and a yellow plastic jacket. This power system offers a surprisingly broad speed range. At low cruise in still air, it floats along not much faster than a paper airplane; yet at full power, you could not run fast enough to catch the plane.

Its injected-foam fuse tends to bounce after a collision without sustaining much damage. I hit a tree at 10 feet (pilot error), and the plane nose-dived into grass. The only damage was a slightly cracked foam nose area that was easily repaired with 5-minute epoxy. Model airplanes don't come much more durable nor safer.

The turnkey package provided by Hobby Lobby includes the Hitec Focus 3 transmitter with micro receiver and two Hitec microservos. This remarkable 3-channel transmitter has a throttle control on the back as well as a servo-reversing feature and a mixing switch for V-tail and elevon control.

PHOTOS BY WALTER SIDAS

Instant success for the newcomer

SPECIFICATIONS

Model name: Wingo

Type: high-wing trainer ARF

Importer: Hobby Lobby

Wingspan: 43.3 in.

Wing area: 403 sq. in.

Weight: 20 oz.

Wing loading: 7.2 oz/sq. ft.

Motor: 7.2V Speed 400 with direct drive

Prop: 4.92x4.33

Battery/ESC used: 8-500mAh AR Ni-Cd cells or 8-1250mAh NMH cells/Jeti JES 10 Acro

No. of channels req'd: 3 (rudder, elevator, throttle)

Radio used: Hitec Focus 3 with two HS80 microservos

Street prices: $119; $359 (turnkey package—includes Wingo ARF, 500mAh Ni-Cd battery, LRP Micro Charger, Race 400 Aeronaut motor, Jeti JES 10 Acro controller ESC with BEC, Hitec Focus 3 single-stick, 3-channel AM radio system and Wingo accessory pack).

Features: injected-foam body with balsa and lite-ply tail boom; foam strip hinges; turnkey package includes all parts necessary for building, charging and flying.

Comments: in the author's opinion, this may be the finest beginner R/C model airplane ever to hit the market, and it's a fascinating study in simplicity of construction and flight for experienced modelers. The turnkey package represents a unique value in ease of assembly, docile flight performance and relatively low cost.

Hits

- Extremely easy, fast assembly.
- Excellent construction manual.
- Extremely forgiving, docile flyer ideally suited to beginners.
- Versatile, fun, park flyer for experienced modelers.

Misses

- Hinges need special attention, or they may fail (see caption with photo showing elevator and stab assembly).

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

On asphalt with full power, the Wingo ROG's within several feet. Its performance rolling off grass depends on the grass and varies. Hand-launching is easiest for beginners: gently throw it toward the horizon at full throttle, and it will gently pull itself away from your hand. In calm air, landings are very slow and therefore very easy. Slightly turbulent air requires more finesse, as the plane is so light that it can easily be caught by a gust as it approaches the ground.

• LOW-SPEED FLIGHT

In still air at low cruise (just enough power to maintain altitude), the craft flies barely faster than a brisk walking speed. Because of its excellent low-speed handling, it can take off, fly less than 100 feet out, pivot 180 degrees in a relatively tight arc and return to achieve a touch-and-go at your feet (see the Wingo video Hobby Lobby offers). In calm air, the Wingo is truly in its element and proves to be a versatile, responsive and forgiving flyer.

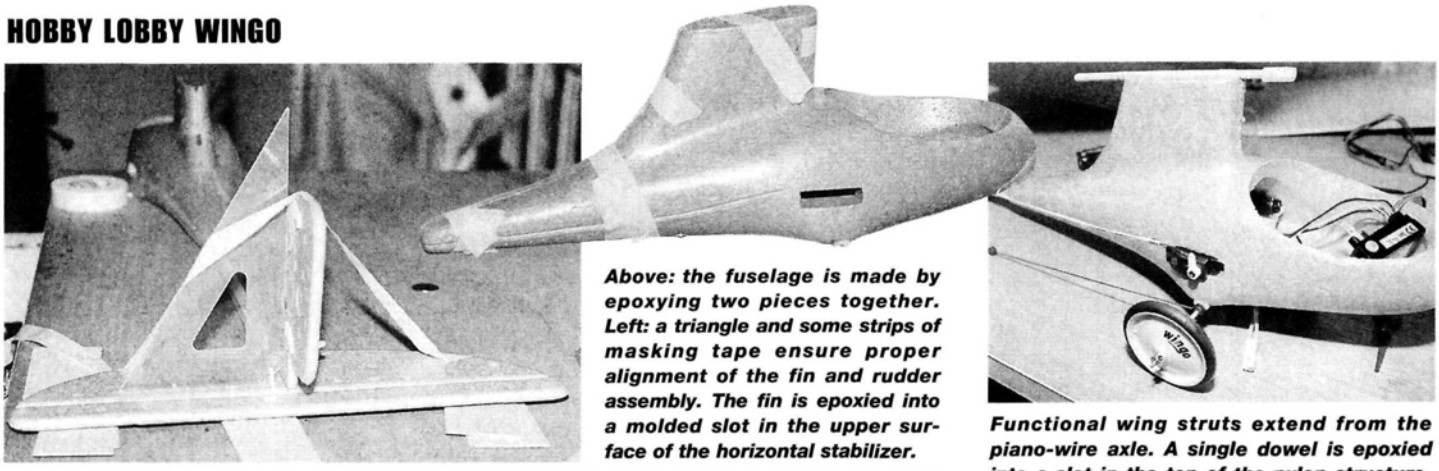
• HIGH-SPEED FLIGHT

Despite its low-speed flight envelope, you will be surprised by the Wingo's ability to accelerate into a mild wind. If you dive at a 45-degree angle at full throttle, the plane will unexpectedly tuck under and dive. If this happens, cut the throttle and give full up-elevator; it will pop out of its dive and recover.

• AEROBATICS

The plane was designed for stability, not aerobatics. Its high, pylon-mounted wing makes loops easy. With the proper application of throttle and elevator, you can manage something of a semi barrel roll. The direct-drive system has ample power for simple aerobatic-like maneuvers, including speedy recovery and climb-outs from near stalls if, for example, the plane is flown in choppy air and caught by a gust of wind near the ground.

Senior editor Chris Chianelli flies the Wingo like a slow-motion control-line aircraft in somewhat choppy air.



Above: the fuselage is made by epoxying two pieces together. Left: a triangle and some strips of masking tape ensure proper alignment of the fin and rudder assembly. The fin is epoxied into a molded slot in the upper surface of the horizontal stabilizer.

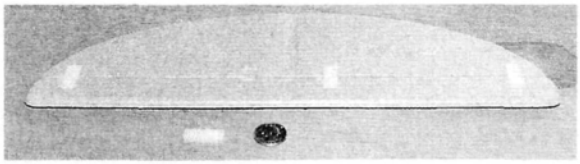
Functional wing struts extend from the piano-wire axle. A single dowel is epoxied into a slot in the top of the pylon structure. Rubber bands wrapped over the ends of the dowel hold the wing in place. Install the servos by pressing them into molded slots, and adjust their positions so that the prebent control rods center on the servo arms and control horns perfectly. A dab of epoxy locks the servo into place.

OVER 20-MINUTE POWER-ON FLIGHTS

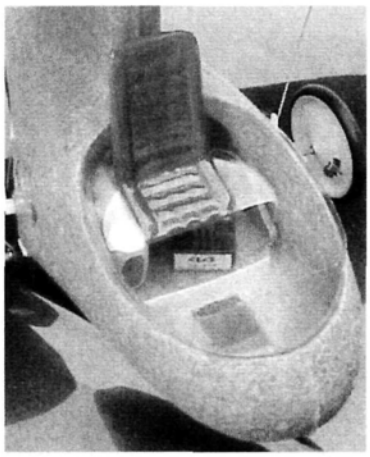
With the 500mAh Ni-Cd battery that comes in the turnkey package version, the Wingo will fly for over 10 minutes at low cruise in calm air. Hobby Lobby offers an optional 1250mAh nickel-metal-hydride battery that weighs about 8 ounces (only 3 ounces more than the stock battery) and is slightly less expensive than the Ni-Cd stock pack.

In a duration test using the NMH battery, we flew the Wingo for 17 minutes, 10 seconds in intermittently turbulent air with gusts of up to 15mph. This required full throttle more than half the time and ⅓ throttle at other times. This was continuous, power-on flight and included a couple of loops and many semi-aerobatic maneuvers as we fought the turbulence.

This seems impressive: only three hours out of the box using the NMH battery, the Wingo will fly for more than 20 minutes in calm air and over 17 minutes in turbulent conditions. Materials, design, price, ease of assembly, docile handling and impressive power-on duration have all converged in the Wingo to create a special value.



Above: to ensure long-lasting hinge performance, epoxy the adhesive surface of the soft foam hinges to the inside of the molded hinge slots (don't just rely on the foam hinge's adhesive strip). Additionally, place a small strip of clear tape over the exterior surface of each hinge half. This tape should extend an additional ¼ inch beyond the hinge proper, spanwise, to attach the outer surface of the hinge to the exterior surface of the stab and elevator. Use the same approach when attaching hinges to the fin and rudder. These measures hold the soft foam hinges in place securely.



Right: the clear-plastic canopy lining holds the electronic components in place. To fly the airplane, simply flip on the radio switch (the supplied Jeti speed control includes a battery-eliminator circuit, so no receiver battery is needed).

EASY ASSEMBLY

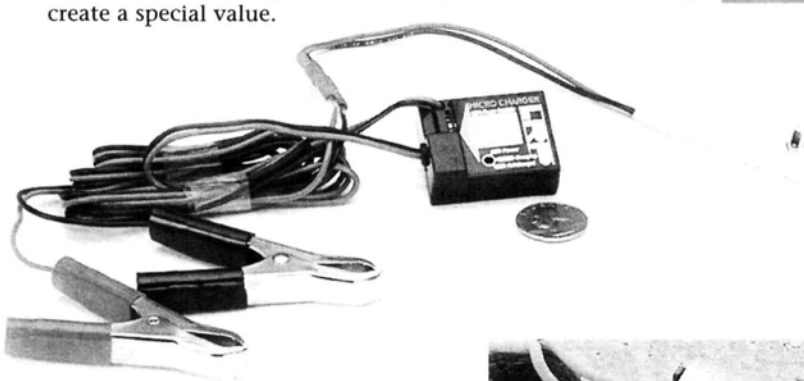
To construct the kit, you simply glue the fuse halves together, glue in the axle brace and tail boom and then the tail feathers (see photos). The axle is then glued in, the wing struts attached and the well-proportioned 2½-inch-diameter wheels locked into place.

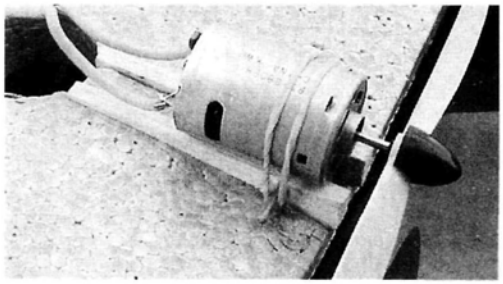
To install the servos, nudge them into their premolded slots, and adjust them to exactly fit the already cut and bent control-rod wires. Epoxy the control-wire tubes into the premolded slots that run the length of the fuselage exterior, and then connect the wires—easy. No need to use clevises or Z-bend tools here. The work has already been done: you just pop the already bent wires into the control horn and servo-arm holes.

Turn the radio on so that the servos electronically center, slip the control wires into place as noted, and add a dab of 5-minute epoxy to secure the servos to the interior of the fuse. I advise the use of Velcro®-brand fastener to attach the battery to the fuse floor, and radio installation is complete.

The clear plastic cockpit is secured with Velcro®; it keeps the lightweight electronic gear and battery where they belong and involves no work other than trimming away the excess plastic left over from when the piece was molded. That's your access hatch and payload carrying bay (plenty of room for a pilot) all in one.

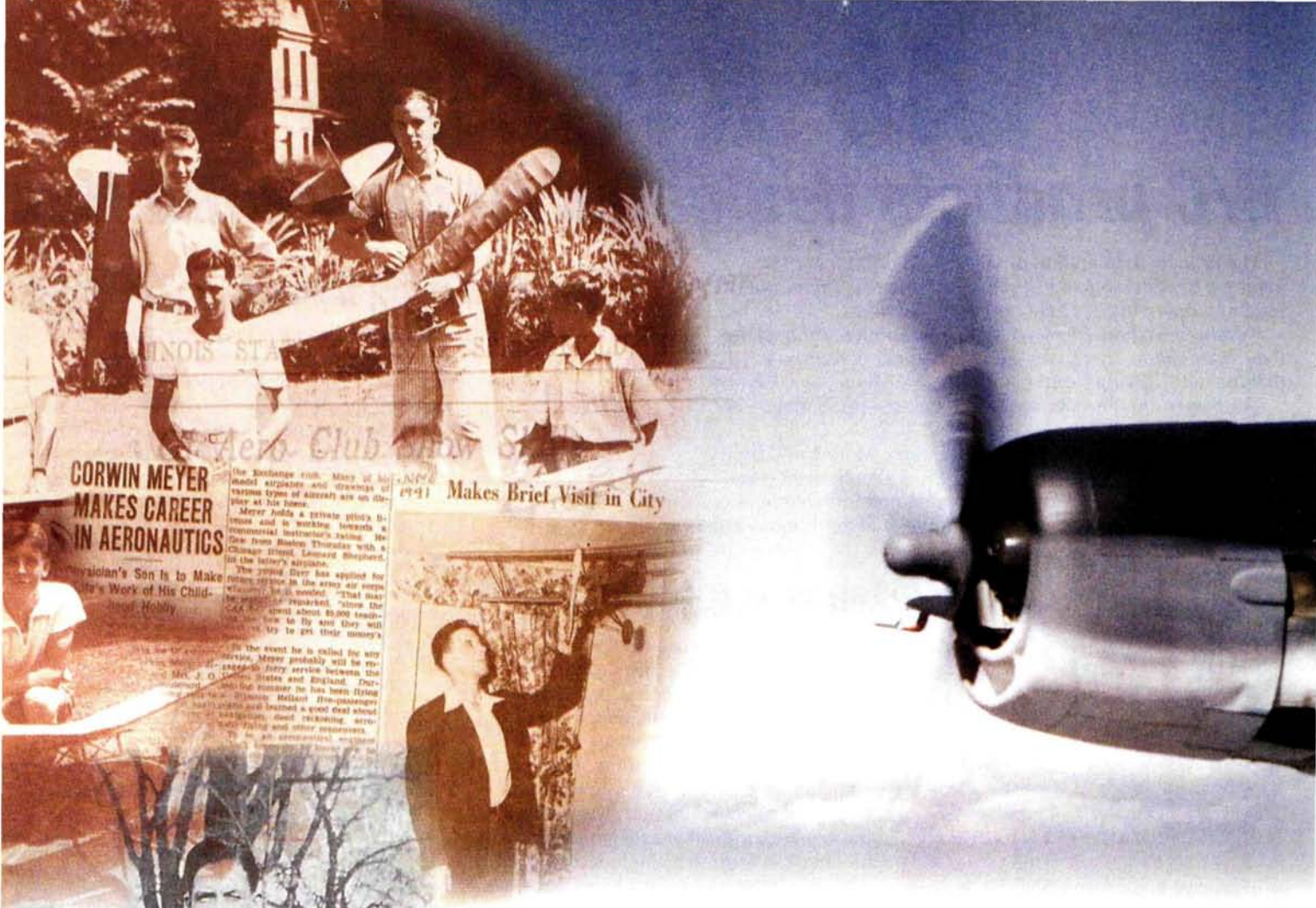
The radio included in the turnkey package is the AM, 3-channel, single-stick Hitec Focus 3. On the back are dip switches that allow both servo-reversing and V-tail and elevon mixing. The throttle switch is also on the back—perfect for adjustment by your left index finger.





Above: the LRP battery charger, shown here connected to an 8-cell 500mAh battery pack, is a study in simplicity. Connect it to a 12V power supply and to the battery, and when it stops flashing, the battery is peaked and you are ready to fly. Right: the motor is held in place by a single rubber band and a yellow plastic "jacket."

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

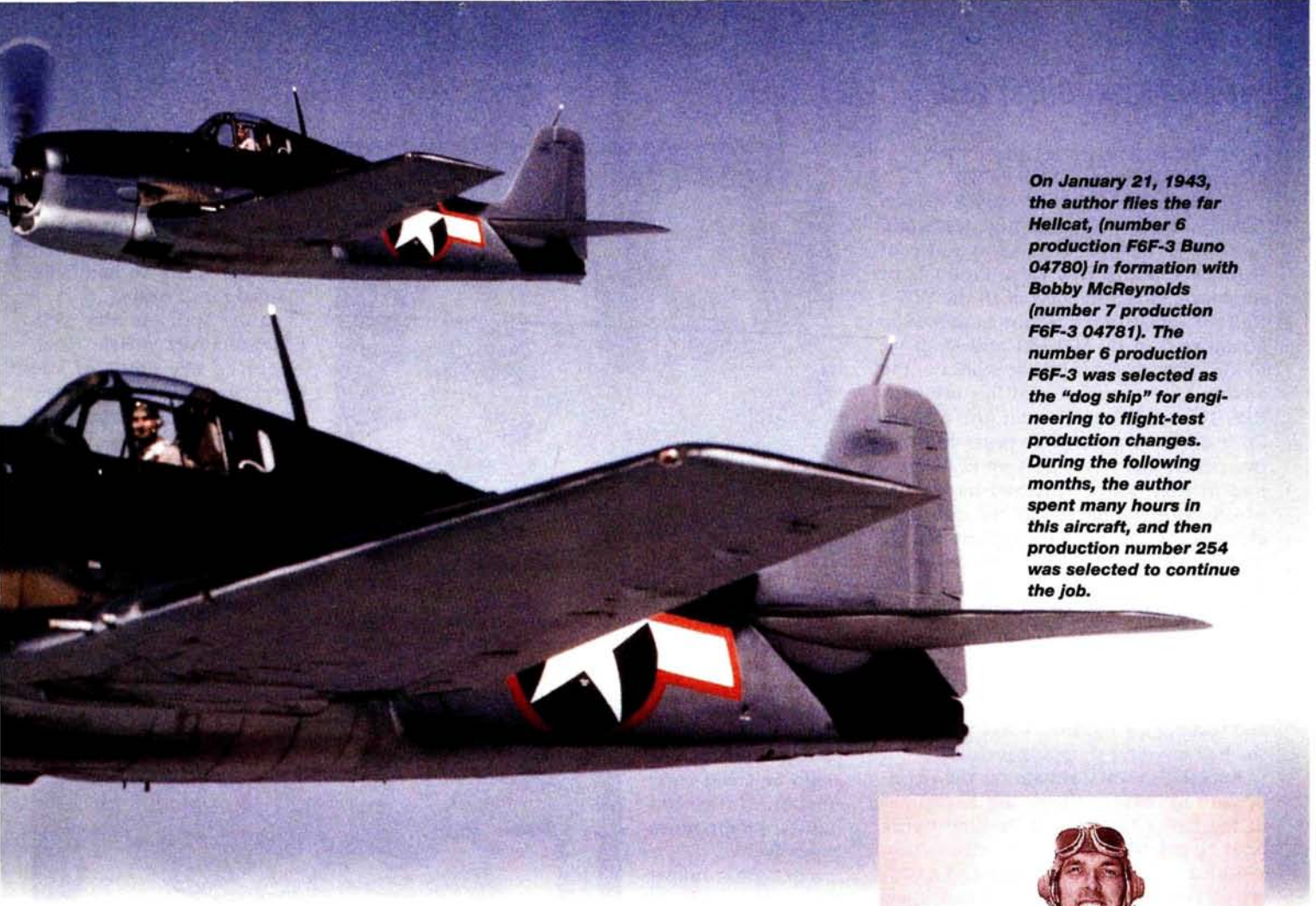


From MODELER

One man's journey in aviation

Thousands of wide-eyed boys were catapulted into aviation after Lindbergh's solo, nonstop flight from New York to Paris in 1927. In my mind, the spectacle of that flight has neither waned as the epitome of adventure nor been eclipsed by any other event. I started hacking out models of the *Spirit of St. Louis* from the slats of wooden cheese boxes immediately after Lindbergh's flight. The most difficult part of modeling was applying cheap F.W. Woolworth silver paint to that porous wood without leaving great streaks of black. I still can't do it.

Counterclockwise from top left: the Springfield Gas Model Club in 1936. I am rear right and holding a California Chief powered by a Model D Baby Cyclone engine. I remember that the aluminum piston and cylinder of the Baby Cyclone didn't last nearly as long as the steel piston cylinder of my Hurlemann Aristocrat, which lasted for many years. • My KG-3 after its completion in 1935. When I was 15 years of age, it took



On January 21, 1943, the author flies the far Hellcat, (number 6 production F6F-3 Buno 04780) in formation with Bobby McReynolds (number 7 production F6F-3 04781). The number 6 production F6F-3 was selected as the "dog ship" for engineering to flight-test production changes. During the following months, the author spent many hours in this aircraft, and then production number 254 was selected to continue the job.

by Corwin "Corky" Meyer

TO TEST PILOT

I had a slightly more intense introduction to Lindbergh when he flew into Springfield (Illinois) Municipal Airport on August 21, 1927, during his countrywide tour after his tremendous flight. My mother was a frustrated housewife who had always wanted to be an aviator, so my brother John, my cousin Armin and I were hustled to the airport an hour before his landing to get front positions at the fence near where his airplane was to be parked. I was still spellbound when he entered his limousine to be driven three miles to the Oak Ridge Cemetery to place a wreath on Abraham Lincoln's grave. My mother hustled us into the car again, and by fast driving and the benefit of back roads, we saw Lindy ride past us at four different places along that route. My cousin Armin and I still remember that Paul Revere-like ride as if it were yesterday.

Shortly after that, my father took me to the YMCA to introduce me to its director, Andy Santenen, who kindly included me in his new model airplane club. There, I was introduced to the Wanner ROG stick-and-wire model that would really take off and fly no matter how badly its parts had been maligned during assembly. At seven years of age, I was

In this 1943 photo, I am flight-testing the Grumman F6F-3 Hellcat (prototype of the F6F-5). Note the high-tech flight equipment!

a long time for me to master the quirks of starting gasoline engines. • At the age of 10, I built this uncovered model of a Stearman Cloudboy. I drew up the plans using a 3-view I had copied from an aviation yearbook in the library. • This model had working controls, and each of its 56 ribs was built up out of nine pieces—just like real aircraft construction. It dried out rapidly and was soon a pile of small parts. I covered all the rest of my many subsequent models. • Benny Howard's Mr. Mulligan, which I built in the summer of 1936 from Cleveland plans I had borrowed from a richer friend. It was non-flying for scale contest events because my friend's Mr. Mulligan didn't fly worth a darn and knocked its landing gear off on each landing. Mine won first place in the Exchange Club contest a few weeks later.

forever hooked on things that left the ground, and I emulated Lindbergh.

In August of 1930, I saw my first issue of *Model Airplane News*, and the real world of aviation opened wide. Ideal and Paul Guillow's model kits, Balsa Products of America's 35-cent models of all the WW I fighters, Scientific's 6-foot monocoupe guaranteed to fly 500 feet and Madison Model Airplane Co.'s lifelike replica of the airship *Los Angeles* were all on my wish list. The Cleveland Model and Supply Co.'s advertisements were pages to drool over; their kits were the very best. They had printed parts, finished hardwood wheels, fiber propellers, all the dope and glue ... everything including plans that we imagined looked like real airplane drawings. In 1932, my mother splurged and bought me the Cleveland Albatross kit for an awesome price of $2.50 "post free." That was enough money to build 15 models, since I was drawing my own plans, stripping my own balsa stringers and spars and stealing my mother's tissue paper that she had saved for wrapping presents.

Robert C. Hare's articles on the development of Fokker fighters, the description of the new Consolidated Admiral flying boat that had flown 2,100 miles from Washington, D.C., to Panama and a variety of aviation articles were in each issue to keep you abreast of all the new developments in the real world of airplanes. The very detailed, exact scale Wylam 3-view drawings were especially important to we modelers who had much more enthusiasm than money. We could adapt the 3-views to build whatever size plane we had in mind.

The latest National Aeronautic Association Junior Membership news was most important to read to find out how much we had to improve our models to compete with model airplane builders who were setting records. John Zaic set a national record of 19 seconds for his hand-launched glider. My best time was 12.5 seconds ... I had a long way to go. Joe Kovel set a record for Fuselage Model Airplanes ROG of 2 minutes, 30 seconds. Everybody's hero, however, was Maxwell Basset. His Class F (gas engine) ROG record was an unheard of 28 minutes, 18 seconds. That was before there was any limit on the amount of fuel carried or the requirement for a 30-second engine-cutoff timer!

I read Charles Hampson Grant's "The Aerodynamic Design of the Model Plane" every month, because he could tell a 12-year-old why an airplane flew poorly—if at all—while using 12-year-old language. His article, "The Effects of Distributions of Weights on Your Airplane's Directional Stability, and Causes of Spiral Diving" educated me far beyond anything he ever realized. I found out later that real fighter aircraft and models could be cured quite similarly of their bad habits, albeit more expensively.

I built this Comet Clipper in September 1938. After flying it for three months, I sold it to a friend in Phoenix, AZ. It had a Brown Junior engine and was a great Carl Goldberg engine/airplane combination.

That great magazine even had book reviews for those of us who were able to take time off from building Polish PZL fighter models to read. I remember reading the review of Dick Grace's book entitled, "I Am Still Alive." He was the daredevil pilot who crashed airplanes for the movies. I couldn't possibly realize that in only eight years, I would be doing the same thing "accidentally" as an experimental test pilot and getting paid a fabulous salary as well.

I was not just an avid model airplane builder who always had layers of glue on his fingers where double-edge razor-blade cuts had chopped them; I was beyond obsession. I was so afflicted that it caused many emotional discussions with my father, who profoundly professed that flying in airplanes was all right with him as long as he could keep one foot on the ground. My grades were passable, but only with the help of my mother, who also talked my father out of wanting his second son to become a Lutheran minister. She saw the handwriting on the wall and happily aided and abetted model airplane building for her simple-minded, aviation-fanatic son.

My older brother kindly took the onus off my shoulders early by following in our father's footsteps and becoming a doctor. My wife said I was so preoccupied with aviation that I didn't appreciate certain differences between the sexes until we had been married for six years.

In the April and May 1935 issues of *Model Airplane News*, I spotted the plans of the Kovel Grant KG-3, and I knew that I was going to build and fly that 8-foot-span beauty if I had to starve to death doing it. I almost did; I had to hoard my 20-cents-a-day high school lunch money to purchase a $21.50 Hurlemann Aristocrat ¼hp engine. After this one-year hunger strike and much wheedling of money from my pliant mother, my KG-3 flew. The first knuckle of my right-hand ring finger still has a large lump that quickly prompted me to learn the tricks of setting breaker points properly to prevent the engine from backfiring during tedious starts. Today, it is difficult to imagine the astronomical cost of that engine. In 1935, its price would buy 43, four-course dinners in a good restaurant. White Castle hamburgers were a nickel, and on slow days, they were two for five cents!

I built this 5-foot-span Travel Aire 4000 because it was my favorite airplane of the time. It did look a lot like a Fokker D-VII, which was a great flying scale airplane. It was black and orange with real aluminum cowls around the cockpit and engine.

When I could get my cranky Hurlemann Aristocrat engine started, I sometimes won model airplane contests with the KG-3. And sometimes—when it continued running—one ounce of gas would keep it in the air for up to 23 minutes while I wildly chased it in a car wherever the roads and the upper wind currents led us. During one flight on May 16, 1936, it drifted over my hometown of Springfield, IL, and circled the capitol building several times until it ran out of gas and crashed against the high school.

(My KG-3 must have had many of my intuitive avenging genes in it!) News of its flight did, however, make the front page of the "Illinois State Register." The state police officers, who had also been following that "airplane," were rather brisk when, at the crash scene, they found out just what they had been chasing. Fortunately, they were both patients of my father.

During the summer of 1937, I taught model airplane building to many bored, but talented children for 10 weeks at 11 grade schools under a government-sponsored program. With $150 dollars burning a hole in my pocket, I gave my mother the almost impossible task of convincing my ground-bound father to allow

Gasoline Powered Model Airplane Makes Record Flight And Crashes On Roof Of High School Building

Reports of an airplane in distress over the state house, and a minute later a reported plane crash at Springfield High school, sent residents in the vicinity scurrying to the scene about 7:40 p. m. yesterday. It proved to be only a model plane.

The model, a gasoline powered plane constructed by Corwin Meyer, son of Dr. and Mrs. J. G. Meyer, in spite of its crash on the roof of the high school, broke all local records for model airplane.

It took off at the local airport at 7:17 p. m. and crashed into the northwest corner of the high school at 7:36 p. m. In taking off, the model stalled five times, but each time recovered without falling to the ground. It circled the airport twenty-seven times, each time enlarging the circle and gaining altitude, flying at a speed estimated between twenty-five and thirty miles an hour. Upon reaching about 500 feet altitude it suddenly took off in a northward direction.

A group of youths at the airport, including Mark Cooper, Lawrence Barr, Harrison Cole and John Meyer, boarded an automobile and followed the plane. They followed it so closely that they saw it crash at the high school.

The plane stopped its straightforward course long enough to circle the state house once, and then started in the direction of the high school when its motor cut out. If it had not struck the high school, it probably would have made a perfect landing, Meyer said last night.

When the plane circled the state house, United States weather bureau officials noticed it and called the airport, asking that officials there investigate a plane which was flying over town without the navigation lights required by law.

The model plane had a wingspread of eight feet. It was powered with a one-cylinder cyclone motor. It made its record, but ill-fated, flight on one ounce of gasoline.

Meyer won the model airplane contest, held a week ago last Saturday at the airport, with a model airplane that was not powered with a gasoline motor.

Meyer said he waited until late in the evening to send up his model yesterday because the air was quieter at that time of the day than any other.

ILLINOIS STATE JOURN... MAR...

Members Of Aero Club Show Skill

—State Journal Photo.

Members of the newly-formed Springfield Aero club are pictured above showing their skill. Left to right, they are: Bill Healy, James Martin, Ray DeSouza, Corwin Meyer, C. Culter Therrien, Lawrence Barr, George Cole, H. H. Cole, Dick Cleary and Emmerson Riley.

me to take flying lessons. Seven dollars and 50 cents per hour dual and $5 per hour solo were trifling amounts compared with my newly attained riches. My instructor was Craig Isbell, who had kindly closed the airport for the hours it sometimes took me to start my user-unfriendly model engine. He knew just what kind of persistent fanatic he had for a student. He is now a very young 96 years of age, and I still communicate with him for his very sharp and clear advice. He helped me transition from Ambroid glue to afterburner blow-outs.

In 1940, I started flying for real (meaning the government was kindly paying) in the Civilian Pilot Training Program. This program complemented the hard-pressed military pilot-training programs to attain the number of pilots needed to implement President Roosevelt's goals: getting 50,000 military aircraft a year airborne for the coming war. During the next two years and while attending MIT, I earned my private, commercial, instrument, instructor and multi-engine ratings and was hired by Grumman on November 11, 1942, as an engineering test pilot. I had acquiesced to my father's wishes and had studied (more or less) in college until the War became my sneaky rationalization for full-time aviating.

I continued to build models whenever I had the time, but as I went up the ladder as the project pilot for the Grumman Hellcat, Tigercat, Bearcat, Panther, Cougar, Tiger, Jaguar and Mach 2 Super Tiger fighters, my priorities changed to full scale. After 19 years as a test pilot, my sins caught up with me and I was consigned to manufacturing management, where I had even more fun building full-scale models. As senior vice president of manufacturing operations, my "model" airplanes were Intruders, Hawkeyes, Trackers and Tomcats with electronic packages that would boggle the minds of R/C model freaks. I continued to fly the Intruder until I retired from Grumman, and I flew Falcon jets when I worked as CEO of that great aircraft company.

In November of 1997, and coincidentally on the 60th anniversary of my becoming a pilot, the Navy logged one hour for me as pilot in command of a Navy F/A-18B Hornet. It is getting harder and harder, however, to talk rational people into letting a 78-year-old model airplane enthusiast fly their expensive toys.

In April of 1998, I was the guest of *Model Airplane News* at the Top Gun scale R/C contest in West Palm Beach, FL. Observing the flying wizardry of models from WW I fighters to jets for two whole days was mind-boggling. I have done Mach 2 for the first time in a brand-new fighter, but I would hastily have turned down anyone who suggested that I could have flown the French Mirage or F4 Phantom models that flew at such awesome velocities and landed crosswind on grass at almost full-scale landing speeds.

It was a very humbling experience to watch so many expert pilots calmly put their creations through their paces while flying in excess of 200mph and performing aerobatics that I had never seen before in any airshow. Spinning a 17-foot-span B-29 with precision recoveries was beyond out of this world! When the pilot of the beautiful F8F-2 Bearcat lost his engine on final and made a very successful landing by popping his landing gear and flaps at the last instant in a gusty crosswind, I realized that I had seen the ultimate in emergency landings of fighter aircraft. I was most disheartened to hear that he was disqualified because his engine had quit on final. The judges simply didn't have a clue as to what really great piloting was. The crashes were accurate to real life and most heart-rending. I realized that model aircraft had come the full circle; those R/C pilots were getting the same thrill as I had flying full scale.

Model Airplane News magazine, Charles Hampson Grant and Joe Kovel were great influences on my entire career, during which I tested 125 models of military and commercial aircraft.

When people asked me what was the best airplane I ever flew, I usually said "The next one." In hindsight, I should have said that the best plane I ever flew was my 6-pound, 8-foot-span, Hurlemann Aristocrat-powered, 1935 model, the Kovel-Grant 3. And it always will be!

by Keith Palmer

Morris Hobbies

TOP CAP

How many times have you thumbed through the pages of magazines and seen pictures of TOC pilots flying their big, powerful airplanes like helicopters? We imagine ourselves at the field doing hovers, tumbles and Lomcevaks and being the envy of everyone. Then the reality of a tight budget or marginal building skills sets in, and we are left with just our daydreams!

You don't need a helicopter to hover

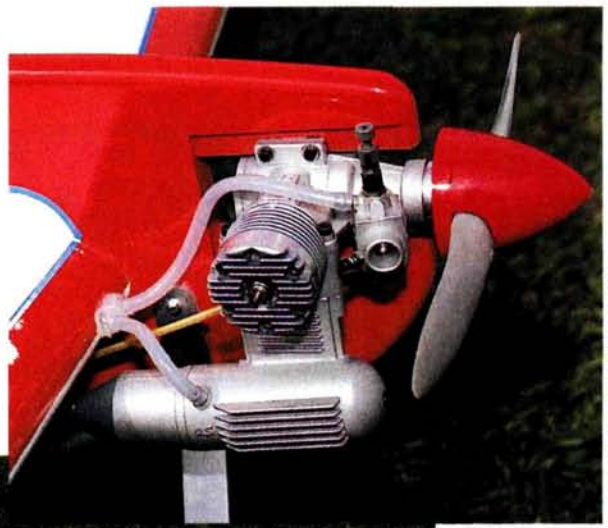
Thanks to Morris Hobbies* and the Top Cap, your dreams can come true without breaking the bank or trying your patience in the workshop. Morris Hobbies has produced one of the most complete kits ever for under $100. Included are a pair of lightweight wheels, fuel tank, hinges, horns, hardware, pull/pull cables and enough extra wood to build a second set of tail feathers. Also included is a very easy-to-understand instruction manual and a well-drawn plan.

This airplane has very large surfaces and a long, wide, built-up profile fuselage that requires a very flat building board that will allow you to pin the pieces down tightly. It is also useful to have a miter sander to make nice, gap-free joints on the 1/8x1/4-inch formers. This will help shorten the building time.

• **Fuselage**. The fuselage is built mostly from 1/8x1/4-inch balsa sticks. Start by laminating the 1/8-inch die-cut canopy, stab support and wing-cutout pieces together. Pin these parts down over the plan, and then cut the 1/4x3/8-inch sticks to size and pin them over the plan to form the outline of the fuselage. A drop of CA on the butt joints will hold the frame together.

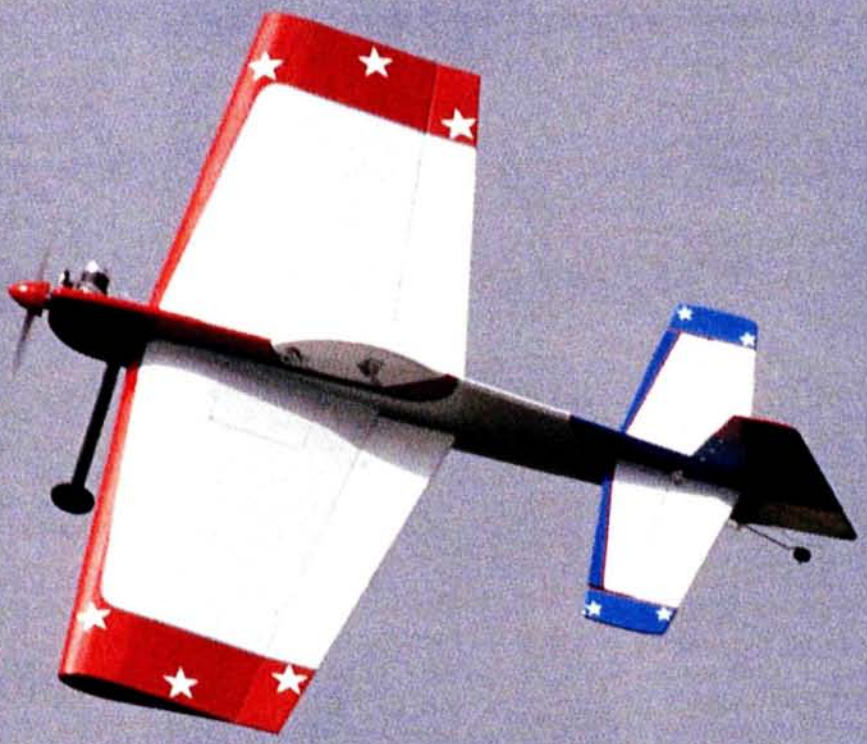
Reinforce high-stress areas with 1/8x1/4-inch spruce. The next step is where a miter sander is worth its weight in gold. With the frame securely pinned down over the plan, cut, trim and sand all of the 1/8x1/4-inch sticks, and glue them into place with thin CA. Take your time and make sure all of the joints are tight. I also like to start with the longest formers first, just in case I cut some sticks too short.

After completing the frame, unpin it and block-sand it lightly on both sides to remove any high spots. The instructions call for the left side sheeting to be glued on next; then you're supposed to install the tubes for the pull/pull cables; I found it easier to do these steps in reverse order. I marked the formers where the tubes were to be routed through, and I drilled them by hand 1/32 inch oversize. This eliminates any chance of the cable binding. Before you insert the tubes into the fuselage, trim them to a length of about 1/4 inch at each end.



BY LARRY MARSHALL AND KEITH PALMER

Above: with the fuel tank in the wing, the installation of the O.S. .46 and fuel lines was easy and produced a neat installation. Left: the Top Cap is one of the best-looking fun fly planes around.



The sheeting is made up of two pieces of 1/8x4x36-inch sheet butt-glued together. Starting with the left side, mark and cut out the exit for the pull/pull tubes. Cut these openings bigger than needed to ensure that the tubes run straight; before you trim the tubes flush, you can fill in around them with scrap balsa.

The instructions call for thick CA or Ambroid glue to be used to glue on the sheeting. I highly recommend Ambroid because it allows you to pin the frame down on top of the sheeting without having to rush. After the glue has dried, trim the sheeting around the outside and make the cutouts for the wing, stab, motor mounts and landing-gear block. Repeat the sheeting sequence for the right side.

Trial-fit the motor mount and landing-gear blocks, then epoxy them into place. The last step is to sand the rear edges of the 1/8-inch ply doublers as shown on the plan's top view, and then glue the doublers into place. I used Hobby Poxy* II and carpenters' clamps for this step. Round off all the corners of the fuselage and the leading edge of the fin as shown on the plan.

• **Wing.** Start the wing by preparing the top leading-edge (LE) sheeting and then pinning the LE and trailing edge (TE) sheeting over the plan. Next, cut all the capstrips to length and glue them to the LE and TE sheeting. At this time, you should also cut out the sheeting around the hatch area and glue it into place.

Glue the 1/4-inch-square spar into place, using a straightedge for guidance to ensure that it is straight. To all of the ribs, glue a 1/16x1/4-inch stiffener vertically between the two spar notches. Then glue the ribs into place on the spars, capstrips and TE. It is important to note that the backs of the ribs are angled, and this angle should be 90 degrees to the building surface.

The next step is to glue in the upper 1/4-inch-square spar and then the precut LE and TE. Now glue on the LE and TE sheeting and the center sheeting and shear webs. Now you can turn the wing panels over and pin them securely down on the building board. Put a bead of thick CA onto the exposed ribs and LE, and roll the sheeting into place. I like to cut enough strips of masking tape to hold the sheeting in place along every inch of the LE.

Now glue the rest of the capstrips and the laminated wingtip pieces into place. The outer wingtip piece opposite the engine gets a rectangular ballast cutout to accommodate the weight you'll need to add for lateral balance before you cover the plane. When the wing panels have been sanded, join them according to the instructions.

When you've fitted the hatch rails and hatch to the wing, it is very important to fuelproof the radio compartment, especially if you choose to put the fuel tank inside the wing. I use Sig* fuelproof clear dope for this.

SPECIFICATIONS

Model name: Top Cap

Manufacturer: Morris Hobbies

Type: fun fly

Wingspan: 44.5 in.

Wing area: 690 sq. in.

Length: 44 in.

Weight: 4 to 4.5 lb.

Engine: .32 to .53

Radio: 4- or 5-channel

List price: $99.95

Comments: kit is very complete; only glue, engine, radio and covering are required. The quality of the wood is very good, and the instruction manual and plans are nearly flawless.

Hits

- Very complete kit; includes all hardware, fuel tank, wheels, hinges, pull/pull cable system.
- Good-quality wood.
- Easy-to-follow directions.

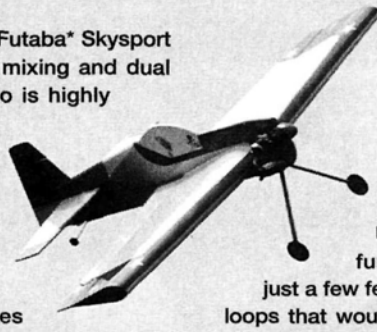
Misses

- Die-cutting could be crisper on 1/8 balsa parts.

• **Ailerons and empennage.** The ailerons and tail feathers are built over the plans in the same way as the fuselage. Start by pinning and gluing the outside framework to the plan; next, carefully cut and sand the inner 1/8x1/4-inch pieces to

FLIGHT PERFORMANCE

I flew my model with a Futaba* Skysport 6A radio with flaperon mixing and dual rates. A computer radio is highly recommended by the manufacturers to get optimum performance from the aircraft, and I agree with them.



• BASIC FLIGHT

Although the model flies well with just dual rates and flaperons, without exponential, it is very sensitive around center. With the flaperons turned off and low rates, this airplane is more forgiving than some trainers! Even with the narrow landing gear, the airplane tracks straight on the ground at ½ throttle and just about hovers on landing with no stall tendencies.

• AEROBATICS

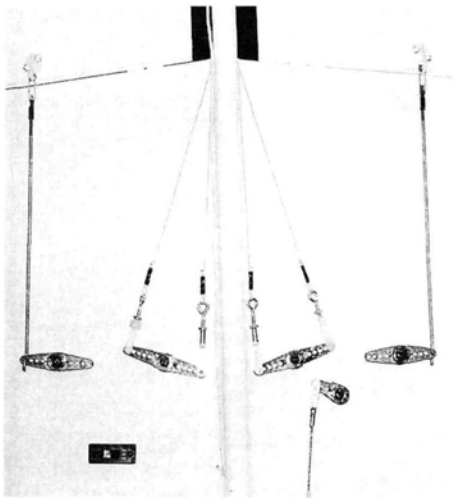
Using flaperons is great fun! I can fly the airplane just a few feet off the ground and do loops that would make any control-line modeler envious. Rolls are straight and true, and on high rate, it will roll out of sight without any elevator input. I am amazed at how low and slow I can fly this airplane right in front of me. Try one; you'll like it.

fit. I used thin CA to tack the parts into position while framing. Between the 1/8x1/4-inch pieces that make up the framework, there are pieces of the same size glued on the inside against the aileron and elevator LEs and to the stabilizer TE. These pieces stiffen the structure, so *do not* omit them. On all of the formers, I use Titebond in a glue gun to make fillets on all the butt joints.

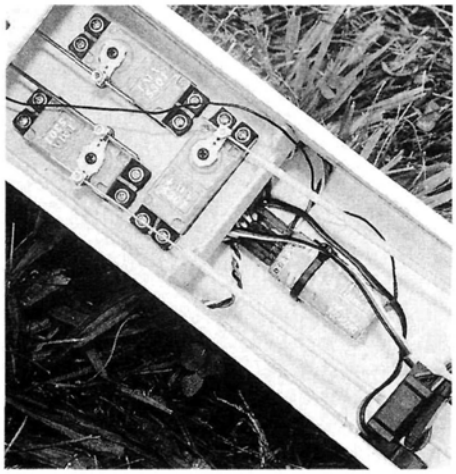
FINAL ASSEMBLY

The instruction manual suggests that you cover the parts before you assemble them, and that works just fine; I chose, however, to cover the fuselage and wing after I had joined them. When I was satisfied with the fit of the fuselage to the wing, I traced the wing opening in the fuselage onto a piece of cardboard that I used as a template when cutting the fuselage covering.

After carefully aligning the fuselage with the wing, I tack-glued it into place using thin CA. Next, I mixed some



A view of the bottom of the wing shows the pull/pull elevator and rudder installation as well as the aileron setup.



The setup on the inside is just as neat and easy to do.

Hobby Poxy II and added just enough microballoons to ensure that the glue would not run. Using a Popsicle stick to apply this mixture, I made a fillet of it all around the opening of the joint. This gives a nicely sized radius all around and makes it very easy to cover. Clean off any excess epoxy with rubbing alcohol (on your finger), and you will have a perfect fillet that doesn't require sanding. *Note: do not attempt this with fast-curing epoxies.*

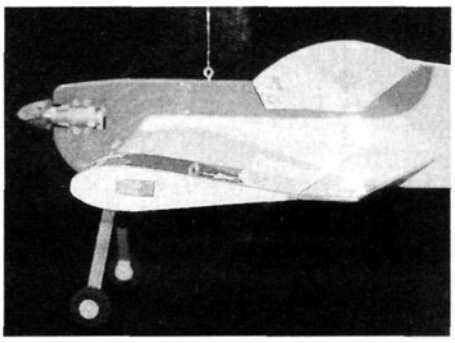
I assembled the tail according to the instructions and covered the assembly using Top Flite* MonoKote. Start covering the fuselage and wing by cutting two pieces of 5/16-inch-wide MonoKote that are long enough to go around the fillet on each side of the fuselage. Center the strips so that they overlap the wing and fuselage evenly. Next, cut a piece of MonoKote large enough to cover the fuselage one side at a time up to the stabilizer LE. To cut out the opening in the covering, use the template that you made of the wing opening. Slide the covering over the wing and start tacking it down around the fillet. Work your way out from the fillet, pulling the covering tight as you go. Overlap the covering about 1/4 inch around the edges of the fuselage.

Cover the wing, fin and rudder next. *Do not cover the wingtip that has the ballast opening until after you've installed the radio and engine*; it should be the last thing you do before flying.

The fuel tank may be mounted outside the fuselage or inside the wing. If you choose to put it inside the wing, seal the area where the fuel lines exit the LE with silicone rubber to prevent the seepage of fuel or oil into the wing.

One important note concerning the pull/pull cables: be very careful not to kink the cable when you set up the controls. A kink, no matter how slight, will prevent the control surfaces from centering.

• **Balancing.** Trial-fit the engine and all the components to check the approximate CG. Position the battery in the wing panel opposite the engine cylinder to help the aircraft balance from side to side. The plan shows where to install an eyehook to hang the model from so that you'll be able to do this. When you've installed all of the equipment and attached the wheels, screw in the hook and fill the fuel tank halfway. Hang the model from the hook and balance it from side to side. Using an O.S.* .46SF with a stock muffler, my model took 1.5 ounces



Both lateral and longitudinal CG balancing can be done by hanging the plane by an eyehook, adding weight and shifting equipment to gain proper balance.

of ballast. After that, you can cover the wingtip and the hole left when you removed the eyehook.

CONCLUSION

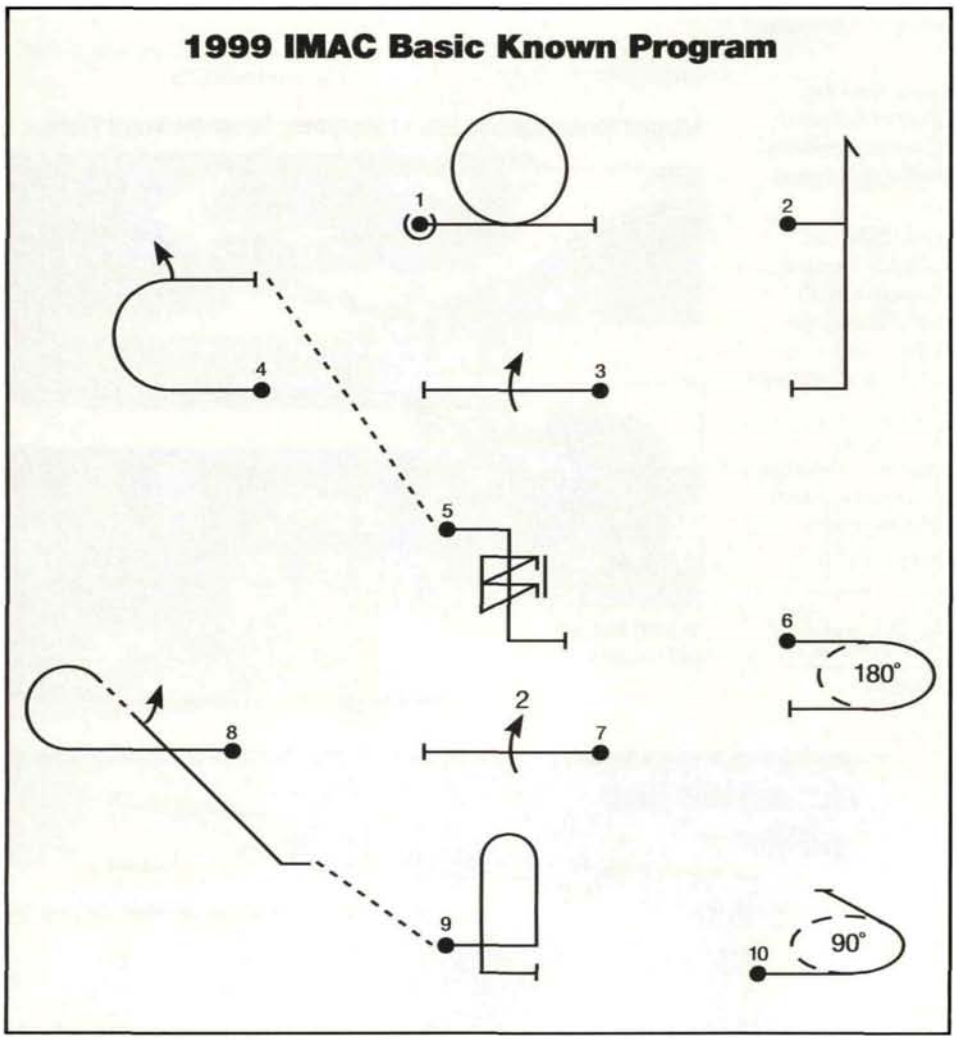
Morris Hobbies has done a great job with the Top Cap. The kit is very complete; only glue, an engine, a radio and covering are required. The quality of the wood is very good, and the instruction manual and plan are nearly flawless. The airplane is really a blast to fly on a calm day, and I am sure that with a little practice, I will be doing TOC 3D maneuvers in no time.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

Precision aerobatic competition is a sport like no other. Whether it is IMAC (International Miniature Aerobatic Club) or AMA pattern, guiding your plane through a predetermined set of aerobatic maneuvers is one of the most gratifying experiences in modeling. Some pilots may contend that aerobatics is not for them, but let's face it: when you first began to learn how to fly, what did you ask your instructor over and over? I'll lay odds it was, "Can I do a loop now?" or "How do I do a roll?" Then, after you cut the trainer cord, did you just continue to fly around the sky in a racetrack pattern executing nice level turns? Once again, I'd bet a handful of Vegas chips that you started toying with rolls, loops, spins and snaps. This, my fellow pilots, is the grassroots of aerobatic competition. What you do from this point on will determine whether you are destined to compete.

Get Ready for FLIGHT COMPETITION

by Dan Wolanski



Practice, practice, practice!

When you watch someone else fly, do you find yourself saying, "I can do that," or "That looks easy"? When that person leaves, have you ever found yourself trying some of the maneuvers you saw him/her perform? If so, you'll recognize the reality that we are all born to compete. If you choose to ignore your primal instinct, so be it. If you want to learn how to harness your zest for competition, read on.

EARLY SEASON

When winter breaks its stranglehold on the land, it's finally time for early season flying—the toughest time in the entire season. Your reflexes and flying skills have diminished during the long hiatus, and if you fly IMAC, you are faced with a fresh set of maneuvers that you may never have attempted. To make the most of this season, start by just flying straight and level for the first few flights. Warm your thumbs up to the feel of flying out about 100 yards in front of you, straight and level. Keep your plane parallel to the runway at all times, and retrace your path with a turn-around maneuver. (If you've read any of my previous articles, you're probably saying to yourself, "Here he goes again on that straight and level thing." Sorry, folks, but the fundamental of every aerobatic maneuver is straight and level flight, and it cannot be stressed enough.) When you are comfortable flying straight and level, you may want to try a few of your favorite maneuvers from last year. This will help to build your confidence, which is key during this time. As your confidence grows, try a few maneuvers from the new sequence, but don't try to fly the entire sequence. Your pilot skills and concentration are at an all-time low, and you will quickly become frustrated. Pick out an easy section in the new sequence and try to fly it "in the box." Then string on more maneuvers until your confidence or concentration becomes strained. This "strain" is analogous to the burn bodybuilders feel. If you don't push yourself, you will never develop your brain to concentrate for an entire sequence, but don't overdo it! Flying slightly strained is good; flying totally strained will surely lead to re-kitting.

By now you will have gone to the field a few times and you may want to attempt the entire new sequence. But before you do, practice the difficult maneuvers; you don't want your brain to freeze up when you get to those parts in the sequence. Take a day or two and fly nothing but difficult maneuvers. When you practice a difficult maneuver, be sure to fly the maneuver that precedes it, and continue with the next maneuver in the sequence in case you

need to adjust your elevation or heading. When you can do the difficult maneuvers, it's time to attempt the entire sequence. Go ahead and give it your best shot. Remember to throttle back between maneuvers to give your brain time to think about the next one. Concentrate on straight and level flight, and don't be afraid to break sequence if you can't quite get it yet. After you go through the sequence once, you will find yourself saying, "I can do it!" Now you're ready for the next step.

Author Dan Wolanski with his scratch-built 28-percent Ultimate.

REFINEMENT

As a kid, you learned "Practice makes perfect," but practicing a mistake over and over does nothing but teach you how to consistently mess up. Let's rework that saying to read "*Perfect* practice makes perfect." Practicing with perfection requires you to formulate a practice plan—a goal or set of goals in your mind—before you head out to the field.

The human brain is like any other organ or muscle: it is strong after resting and tires with use. This means that you are sharpest during your first flight or two, and then your eye/hand coordination deteriorates and your reaction time slows. Your ability to detect minor heading changes or flaws decreases, and flying becomes more difficult. The practice plan you develop must revolve around your ability to concentrate, so you should perform the most difficult maneuvers first. For this reason, I suggest you fly the entire sequence on your first flight of the day. Fly it exactly as you would at a contest. Resist the temptation to mess around or go back to redo a bad maneuver. If you screw up a maneuver or part of the sequence, do not stop; press yourself through the entire flight. This is exactly how you will feel on your first flight in a contest: fresh off the bench and into the air, you need to teach yourself to calm down quickly for the first sequence of the day. Also, your brain is at its most responsive during your first flight, and you should use this time effectively. Have your caller watch for areas that need improvement, and after the flight, sit down with him or her to review any flaws and agree on how you should attempt to fix them.

Start your second flight by attempting to fix any errors you made in the first flight. Have your caller direct you to the problem areas of the sequence. Be sure to fly exactly where you intend to fly it in the context of the sequence. This is very important. If you are having a problem with an end maneuver, do not practice it in the center because it will look completely different to you. Likewise, do not practice the segment close in if you usually fly farther out. Perception is everything; if your plane looks "different" to you when you're trying to improve a maneuver, you will defeat the purpose of the plan. When you get to the problem maneuver, have your caller verbalize the fix immediately before you attempt it. If you want, your caller can even tell you when to input rudder during the maneuver by saying, "Now." You will be amazed at how much verbal cues help when you are trying something new. If you notice an improvement but still agree it isn't as good as you would like it, turn your plane around, chop the throttle and listen to your caller's suggestions. For example, your caller may say, "It looks like you gave enough rudder, but the input was too abrupt. Try to input the rudder more smoothly." Armed with this revised plan, go back and try it again. Once again, have your caller verbalize the fix right before and possibly during the maneuver. If you notice improvement, great! Go back and do it again to confirm your results. If you don't, go on to the next segment that needs improvement. You can revise your plan after you land and agree to try something different on the next flight.

Before attempting your third flight of the day, I suggest you relax a bit. More than likely you are a bit fatigued. You will probably have a newfound spark about you if you did notice improvement in your second flight, and you will be eager to test your skills within the sequence. If you feel up to it, go ahead and attempt the entire sequence. Chances are your brain will not be as sharp as before, but you should notice an improvement. You may want your caller to remind you of the fix again. I have found this very helpful until I become comfortable with the new inputs. If you attempt any more flights, I suggest that you work on specific maneuvers, just as you did in flight no. 2. By now, your brain is past its peak responsiveness, and you may not be able to concentrate for an entire sequence. If you push too hard,

you risk frustrating yourself and losing some of the confidence you gained.

CONTEST WEEK

The week before a contest should be filled with mostly complete sequences. By now, the refinement technique has certainly resolved or aided your quest to obtain higher scores on your weakest maneuvers. Now it is time to practice the entire sequence again. After all, the sequence must be flown with precision and grace. If you don't polish the entire package, your net gain will be zilch! If a particular maneuver is still giving you problems, do the best you can to improve its presentation, even though you know it isn't perfect. This week, resist the temptation to go back and fix botched maneuvers during a sequence. You must train yourself to recover and continue. Mistakes happen during contests, and you need to be prepared for them.

Your equipment must also be in perfect working order. Go over every inch of your plane to be sure there are no loose fasteners or parts. Be sure your engine is in top working condition. If you are worrying about your engine quitting during the sequence, you are sure to lose points. Now is the time to work out every detail of how your plane will perform on contest day. Make any adjustments to the airframe or engine early in the week to allow for test flights. Never make adjustments immediately before a contest without making a test flight. You do not want to show up at a contest with an unforeseen problem that may have been induced by your adjustments.

CONTEST DAY

Contest day is all about focusing on what is between your ears. If you have prepared properly, you should be confident. Your biggest challenge is to scope out the field and find some visual clues. After all, your plane won't know the difference between landing at your field or one 300 miles away, but you sure will! If you can, fly at the field the day before the contest. Fly a few sequences and get the feel for the landscape. You will need to adjust to the prevailing winds, sun direction and landing conditions. If you have a chance to fly on the morning of the contest, do so only to verify that your engine mixture is set properly and your plane is trimmed. Resist the temptation to do a complete sequence; save your concentration for later.

As the contest begins, try to relax and maintain your composure. Sure, you're going to be a little nervous in front of the judges; that's normal. But don't let it get the best of you. If you notice that you are scoring particularly poorly on a certain maneuver, you may want to ask the judges what they saw. Try to obtain as much input regarding your performance as possible. If the remedy to scoring higher on a particular maneuver is very simple, e.g., you aren't flying fast enough for the current wind conditions, you may want to try it on your next attempt. If the remedy requires a bit more thought, e.g., your point rolls are not being placed where they should, do not attempt to fix it at the contest. Catalog and make notes on ways to improve maneuvers, but resist the temptation to drastically alter the way you have been performing them. Adjusting to environmental changes is something that must be done at every contest, but fundamental changes in the way you fly must be practiced before you're in front of the judges.

UNKNOWN SEQUENCES

The beauty of IMAC is that you are often required to fly an "Unknown" sequence during competition. An Unknown is a never-before-seen sequence that is given to the pilots the night before they fly. You can review, talk about and pretend to fly the sequence with a "stick plane," but you are not allowed to actually fly or practice the sequence. The next day, you must perform this new sequence in front of the judges for part of your overall score. Unknowns usually separate good pilots from great pilots. Pilots who have years of experience tend to do better because they have flown nearly all of the individual maneuvers at some time or another. Pilots who have practiced the "Known" sequence but have little contest experience find themselves at a slight disadvantage. One thing is sure: there's nothing like being handed a sequence the night before and flying it the next day. If you are uncomfortable about flying Unknown sequences, don't worry; they are only found in the Sportsman, Advanced and Unlimited levels of competition. Basic flyers are never asked to fly an Unknown, but some contest directors will allow basic flyers to participate to gain the experience. The scores will not count toward the contest totals, but the experience may be enough to compel you to move on to the next class.

AFTER THE CONTEST

You may want to take a few days off from flying after a contest. Chances are, you're a bit burned out and need to relax. When you do get back to flying, pull out your notes from the contest along with your score sheets. Focus on the maneuvers with the lowest scores, and work on them using the refinement technique outlined previously. As the season progresses, you should find yourself becoming very confident in the sequence and in your flying abilities in general. Practicing for competition will make you a superior pilot more quickly than you ever imagined. You will also find you are able to recover from any attitude or heading with ease and confidence. You may even begin to practice maneuvers from the next higher class to "test the waters." By all means, continue to press yourself and experiment with precision aerobatics; one day you may find yourself with a wall full of trophies and a lifetime full of memories.

THE IMPORTANCE OF A CALLER

A caller is perhaps the pilot's most useful tool in practice and competition. As you can see in the photo, the caller stands directly behind the pilot during the sequence and helps guide the pilot through the flight. A caller has many functions, the most obvious being to call out the next maneuver. Yes, even if you have practiced your sequence a hundred times, you will be amazed at how absent-minded you can become in front of a set of judges. A good caller will not only call the maneuver, but will also help you see things in your flight that you may miss. You may not notice that you're losing heading or elevation, but a good caller will. A great caller will do all of this and tell you the transmitter input to correct your mistake. For example, if you exit a maneuver and seem to be heading away ever so slightly, your caller may tell you, "Left rudder; you're heading out." It is perfectly legal for your caller to tell you anything you want during a sequence. While some may find it distracting, I see it as a great advantage—especially if your caller is another competitive pilot.

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

There's nothing like a twin-engine ARF

HOBBICO

TWINSTAR

by ELSON SHIELDS

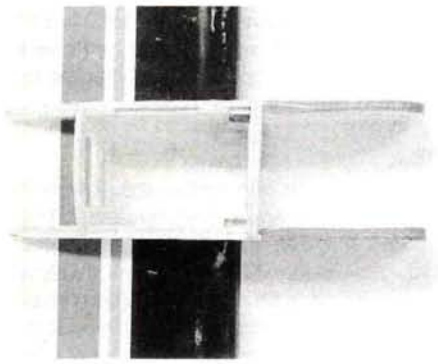
When my flying buddy and I first saw the advertisement for the Hobbico* TwinStar ARF, we both had to have one. We are prime examples of the fast-growing group of ARF pilots who are sweeping the country. As mid-career professionals, neither of us has the time to build wood kits; a wood plane would take a couple of years to complete.

When the box arrived, I immediately opened it and found a high-quality, carefully packed model. After looking over all the pieces, I could not figure out how to make them fit back into the box so, naturally, I had to start building the model! After I had thoroughly read the 35-page manual, I began assembly that evening.

THE KIT

The wings of the TwinStar come covered with low-temperature film, and the ailerons are completely installed. The wings are built-up D-tube construction and appear to have been constructed straight. The fuselage is constructed from balsa and lite-ply and the tail feathers are also made of balsa. Both the elevator and rudder come installed.

Wing assembly is straightforward. Make sure all the parts fit before you glue them into place. I epoxied the lite-ply endcaps to the root of each wing with 30-minute Zap* Z-Poxy and taped the caps in place until the glue set. Make sure that you recheck the alignment of the endcaps before the epoxy fully cures. The endcaps come with an alignment tab for the front of the wing that fits into a slot in the fuselage former just in front of the wing saddle. The dihedral brace is made of three pieces of lite-ply that need to be laminated together with 30-minute Z-Poxy. After I installed the dihedral brace, I joined the two wings with Z-Poxy. Make sure the leading and trailing edges match, and secure them with masking until the glue sets up.

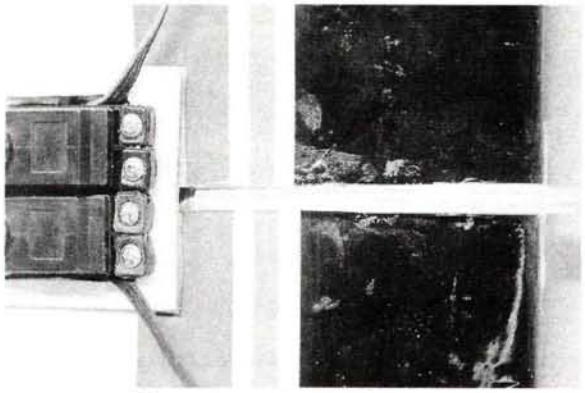


The engine nacelles come with the proper engine-thrust offset already established. You have to attach them to the proper wing panels. Pay attention here.

I chose to reinforce the wing joint with fiberglass and resin. I trimmed back the covering on each side of the joint and secured the fiberglass in place with Zap thin CA. Then I lightly sanded the seam, coated it with Balsarite* and covered the fiberglass with white MonoKote.

The installation of the engine nacelles was very straightforward and quick. Make sure you read the instructions because there is a right- and left-hand engine nacelle. Each nacelle has some side thrust built in, and both must be installed on the proper side of the wing. This side thrust helps gives the plane stability in an "engine-out" situation. Remember to fuelproof the inside of the nacelles with epoxy thinned with alcohol. The provided 5-ounce fuel tanks fit within the nacelles nicely. There is not enough room in them for larger fuel tanks.

The engine mounts provided with the kit did not fit the larger engines I planned to use, so I replaced them with Great Planes* adjustable mounts. Since these mounts are thicker, I also had to replace the original mounting bolts with longer ones. For the initial flights, I decided to use a pair of well-broken-in O.S.* .32s. The installation of the engine throttle linkages went according to instructions, and there were no surprises.



The root caps that you glue to the wing panels form the alignment tab that secures the wing LE to the fuselage.

The installation of the main landing gear required only the cutting away of the film covering above the slots and a pushing of the gear into place. The wire main gears are held in place with nylon straps. I covered the landing-gear slots with narrow pieces (¾ inch) of white MonoKote to seal the area against oil residue before I installed the landing straps.

FUSELAGE AND TAIL FEATHERS

The installation of the tail feathers was quick and straightforward. I was pleased to find that the slots had been cut accurately. When I slid the horizontal stab into place, it was level in the slots and didn't require sanding. The same was true for the vertical stab. After trimming back the covering, I glued both surfaces into place using 6-minute Z-Poxy.

I laminated the wing hold-down plate from three precut pieces of lite-ply and 30-minute Z-Poxy. After the glue cured, I snapped the hold-down plate into place and secured it with 6-minute Z-Poxy. I had a slight problem while drilling the wing hold-down holes, as I drilled one hole too close to the edge of the plate. To avoid doing this, mark and drill your holes carefully. When I trial-fit the wing into the saddle, I needed to widen the slot in the front former only slightly for the wing alignment tab and then lightly sand the

The completed wing and fuselage await final assembly.

SPECIFICATIONS

Model: TwinStar

Type: twin-engine sport ARF

Manufacturer: Hobbico

Wingspan: 56 in.

Wing area: 567 sq. in.

Weight: 6.6 lb.

Wing loading: 26.8 oz./sq. ft.

Airfoil: semisymmetrical

Engine req'd: two .20 to .40 2-strokes, or two .26 4-strokes

Engine used: two O.S. .32 2-strokes

Radio req'd: 4-channel with 5 servos (rudder, elevator, aileron, throttle)

Radio used: Airtronics Stylus PCM 8-channel

List price: $179.99

Features: 95-percent prebuilt balsa and lite-ply wings and fuselage; factory covered and all hardware included; well-illustrated instruction manual.

Comments: this airplane was well thought out and goes together quickly. The manual provides step-by-step details and the parts fit and finish of the TwinStar are excellent.

Hits

- Excellent instructions.
- Precision parts fit.
- Total assembly time of 15 hours.

Misses

- Rudder and elevator servos were mounted too far back in the cabin, so the plane needed nose weight to balance.

FLIGHT PERFORMANCE

The day arrived to test-fly the TwinStar. After checking the RX voltage at the field and assembling the plane, I started and tuned each engine individually. Both engines were turning a Master Airscrew* 10x6 Scimitar prop at about 12,000rpm and were within 200rpm of each other. I started both engines and range-checked the radio. What a sound twin engines make when they are running in synchrony. Timing a full-power engine run on the ground, I found that the 5-ounce tanks ran dry in 8.5 minutes. I couldn't wait to fly the TwinStar. I topped off the tanks, started the engines, pushed the butterflies aside and taxied out to the runway.

• TAKEOFF AND LANDING

I pointed the TwinStar into the breeze and slowly advanced the throttle. The model tracked straight down the runway without any rudder correction and lifted off after about 100 feet. The plane lifted off at about ½ throttle and gradually climbed out at about ¾ throttle. I trimmed out the TwinStar with 4 clicks of up and 2 clicks of left aileron.

Landing is a matter of simply lining up with the runway and chopping the throttle. My first attempt resulted in a very hot landing, since I didn't have the engines idled down enough. In subsequent landings with the .32s idled way down, the model settled onto the runway nose high and on its main gear. After touchdown, the nose settled quickly, and the model slowed down with no surprises. After a few landings, I tried deploying flaperons on the final approach. The use of flaperons provided the extra drag to slow the TwinStar to a reasonable landing speed with the more powerful .32 engines.

• LOW-SPEED PERFORMANCE

This airplane has great low-speed stability and performance. If you can get this plane to stall, the right wing will dip and the nose will drop. Add a little throttle and a little up, and the airplane will recover straight and level. I felt very comfortable flying this plane in close and with the engines at high. Deployment of flaperons required no elevator mixing for level flight and increased the low-speed stability of the aircraft.

• HIGH-SPEED PERFORMANCE

The TwinStar went through the radar trap in excess of 75mph. This is too much fun! The airplane tracks well, goes wherever you point it and is very stable at high speeds. It doesn't show any bad tendencies and was very predictable. If speed is your thing, a pair of .32s or .40s will really get your heart pumping.

• AEROBATICS

Aerobatics are not TwinStar's best selling point. Inside and outside loops were easy and round; rolls to the right were faster than rolls to the left but were crisp and nearly axial. With the semi-symmetrical wing, a little down had to be fed in when the plane was inverted. Knife-edge reveals a fair amount of roll coupling in the design, and more than usual rudder is needed for sustained knife-edge flight. I was unsuccessful in getting the TwinStar to spin until I mixed rudder with reduced opposite throttle.

• ENGINE-OUT BEHAVIOR

The TwinStar is surprisingly stable with one engine out. The first time an engine quit, I was making a high-speed pass overhead. The plane reacted by dipping the left wing slightly (it was the left engine that had quit). I continued to fly the plane at high speed for nearly a minute wondering why it was suddenly a bit out of trim. Then I realized that one of the engines had quit. I throttled back to about ½ throttle and landed the plane. No major rudder deflection was required to keep the plane under control. The second time an engine quit, I was making stall turns at a low altitude and with the engines at high idle. The plane started to dip its wing, which is easily corrected with opposite aileron, and I increased power to about ½ throttle. I circled the field and landed. The TwinStar is slightly more difficult to line up on the runway and requires a bit more rudder with an engine out; other than that, there are no surprises.

edges of the alignment tab. After this minimal effort, the wing fit perfectly. To help you avoid losing the wing hold-down bolts, they are retained in their holes with O-rings.

RADIO INSTALLATION

The servo tray fits into notches at the rear of the cabin, and I glued it into place. I found that this location was too far to the rear and caused a balancing problem. If the servo tray were mounted in the front of the cabin, less weight would be required in the nose to balance the model. Rudder and elevator pushrods are pre-assembled, requiring only a few drops of thin CA to secure the pushrod ends before installation. The pushrod installation was straightforward and there were no surprises. To make screwing the nylon clevis onto the pushrod easier, add a drop of oil to the threads.

Synching the engines is very important to good twin-engine aircraft performance. They should be within 200rpm of each other. A good, reliable idle and transition to full power is also very important.

I chose to use my 8-channel Airtronics* Stylus to provide flexibility in setting up and flying this airplane. The Stylus has a twin-throttle mode that allows each engine to be adjusted electronically for more precise, synchronous engine operation. I also used separate servos for each aileron to fine-tune aileron differential and have the option of using flapperons. I used Airtronics servos (part no. 94102) and added ball bearings by using the LDM* conversion kit. While full-size servos can be used on the engine throttles, I decided to use Tower* TS-11 microservos on them to save weight. I also used Tower TS-55 ball-bearing servos on the rudder and elevator. Since the airplane required additional weight in the nose to balance, I used a 1200mAh 5-cell pack to power the onboard electronics.

FINAL SETUP

The only thing left to do was to assemble and mount the plastic nose cone and nacelle covers. After carefully trimming the nose cone to fit, I glued the two halves together using Zap CA. I reinforced the seam and the back edge with tape glued into place with thin Zap. I also reinforced the areas of attachment on the nacelles with nylon cloth and CA. I shock mounted both the nose cone and the nacelle covers by enlarging the attachment holes in the wood and gluing in short pieces of fuel line with flexible RC-56 adhesive. Then I screwed the attachment screws into the fuel tubing. Be careful when drilling the holes in the nacelles; as the directions state "Drilling a hole in the fuel tank would not be a good thing."

The completed TwinStar with two O.S. .32s came out tail-heavy. Moving the engines forward on the mounts didn't help very much, so I returned them to the position shown in the manual. To achieve proper balance, I pushed a 5-cell 1200mAh pack as far forward in the nose as possible and used Harry Higley* safety spinner hubs on the engines in place of the provided plastic spinners.

I checked the surface throws and adjusted them according to the manual, and I sealed all of the glue joints with a thin bead of RC-56 adhesive (around the stabs, nacelles etc.) to seal out exhaust residue. The total assembly time was about 15 hours.

The minimum engines for the TwinStar are plain-bearing .25s, and the maximum engines are either plain-bearing .40s or ball-bearing .32s. Resist the temptation to use either ball-bearing .40s or .46s. They provide too much power for this airplane, and the risk of airframe failure is too high (particularly if you don't fiberglass the center wing section and reinforce the horizontal stabilizer).

The TwinStar is a very solid flying airplane and is very quick with engines larger than .25s. With the larger engines, this airplane tends to land fairly hot unless the engines are at a very low idle. Engines for the TwinStar need to be well broken in and carefully adjusted so that they transition smoothly. With both engines tuned and humming, this plane flies like any well-designed single-engine airplane, but its sound sets it apart. After flying the TwinStar, I am hooked on twins! I wonder if there are any P-38 Lightning ARFs available?

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.* +

PZL-P38 Wolf

Sport-scale version of a little-known Polish fighter bomber

by Roy Day

I FIRST SAW a picture of the PZL-P38 Wolf fighter bomber in an old 1959 issue of *Air Progress* magazine. It was developed by Poland between 1938 and '39. Only two prototypes were built: one was flown, and both were destroyed during the German invasion of Poland in September 1939. I liked the lines of the P38 and thought it would make an interesting twin. A little later during the project, I struck up a correspondence with Polish modeler Piotr Zawada, who furnished me with a 3-view and some photos of the PZL-P38. The aircraft probably would have been good as a ground-attack fighter, but it could only carry a couple of small bombs under its wings. It has some interesting lines and is certainly not frequently modeled, if ever.

WING

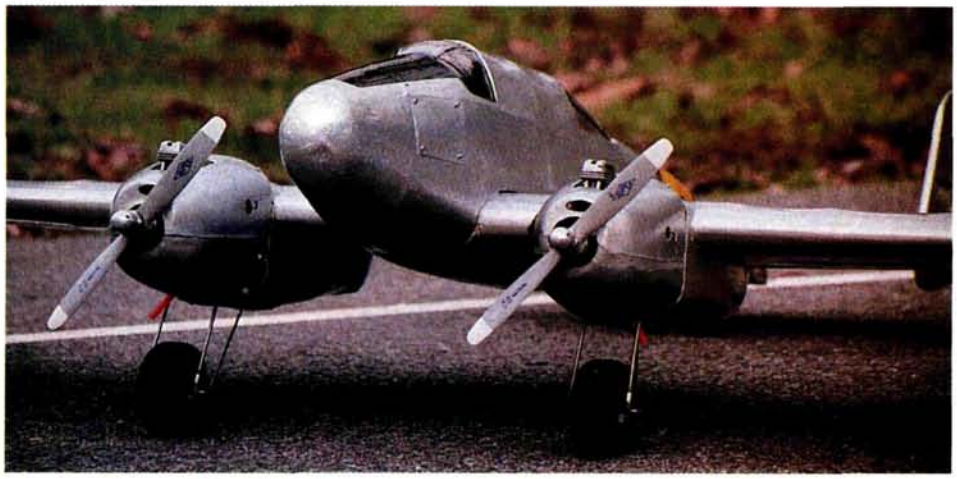
For a conventional twin such as the PZL-P38, the most complicated part is the wing, which has the engines, nacelles, landing gear and fuel-system plumbing in addition to the usual servos and control linkages. The airfoil is flat from the trailing edge (TE) to the forward bottom spar, so you can build the wing flat on your board.

Make the forward spar by laminating two 1/8x1/4-inch spruce or basswood pieces as shown on the plan. Make the spar caps long enough to extend onto the wingtips for added strength. Lay your ribs on the plan, and mark the hole locations for the aileron control cables and throttle cables and the pressure and fuel lines for the engines. Don't trap yourself by installing the wing sheeting without first installing these lines and cables.

Lay down the 1/16-inch TE sheeting and both lower spar caps. Jig up the TE at the tip rib, R-9, 1/4 inch to give about 2 degrees of washout. Glue in all ribs except R-1, the center rib. Put R-1 into place but don't glue it until later, when you are ready to join the wing halves. This is necessary because you are building on the tapered bottom of the wing, and when you assemble the wing upside-down on a flat surface (no dihedral), you want those center ribs to fit together perfectly. Now add the top spar caps, one of the leading-edge (LE) laminations, aileron hinge blocks and horn plate and the shear webs. Now you can glue on the TE sheeting.

Remove the panel from your board, and build the other panel to this same stage. Join the wing panels upside-down on a flat surface. Pull both center R-1 ribs together to make a good joint, and glue them to their respective wing panels. Chances are, if you had glued them in earlier, they would not fit exactly.

PHOTOS BY ROY DAY & JIM HAWKINS



The PZL-P38 sits on the tarmac and awaits its next sortie.

Glue the carbon-fiber strip on the bottom of the forward spar cap. Now glue in the bottom LE sheeting, and turn the joined wing over to the upright position. Add the carbon-fiber reinforcement to the top of the main spar. With your lines and control cables in place, you can now put on the top LE sheeting in one continuous piece across the center joint to make the wing stronger. Fill in the remaining sheeting as shown on the plan, and add the rib caps. Add carbon strips on top of the sheeting at the LE and TE as shown on the plan. Cut out the ailerons and face the openings with 1/16 sheet. Add 2-ounce fiberglass cloth and resin out past the nacelles as indicated on the plan. Glue on the wingtips and the remaining laminations for the LE, and sand to shape. Set the completed wing aside.

You may be wondering if I've forgotten the dihedral braces; there are none, as they are not needed. For this thick wing, at the root, the needed strength comes from the continuous skin, plus the fiberglass cloth, plus the carbon-fiber reinforcements. I can vouch for its strength because a nasty crash broke only the wingtip. You don't need dihedral braces on this wing.

SPECIFICATIONS

Model: PZL-P38 Wolf

Type: sport-scale twin

Wingspan: 66 in.

Weight: 7 lb.

Wing loading: 25 oz./sq. ft.

Length: 47 in.

No. of channels req'd: 4 (throttle, aileron, elevator, rudder)

Airfoil: semisymmetrical

Construction: built up with balsa, ply and foamboard formers

Engine: two, .48 4-strokes

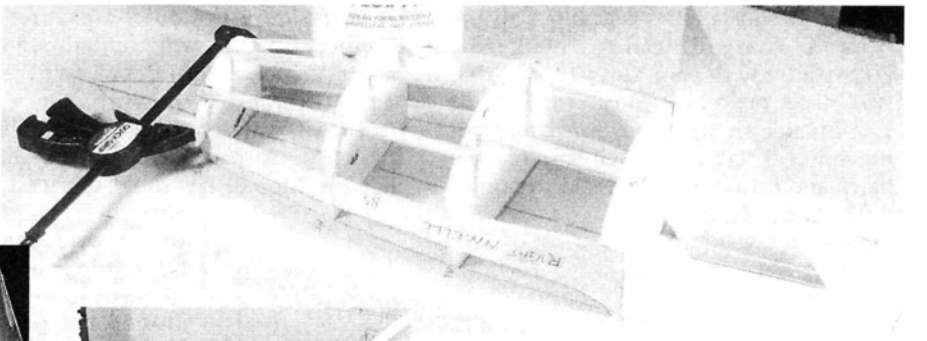
Comments: the Polish PZL-P38 fighter bomber is an obscure airplane with interesting lines and impressive performance. I used the Cline fuel-regulation system and a single fuel tank in the fuselage. I modified the carb bleed holes slightly, and the power system is very reliable.

The PZL-P38 is indeed an unusual modeling subject. Had the design survived, the full-scale plane would have made a good ground-attack fighter.

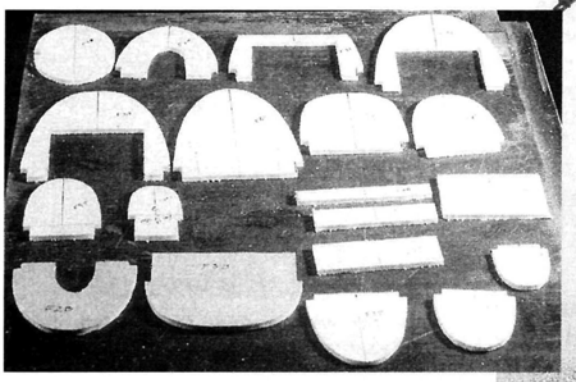
NACELLES

To make the formers, I used plastic See-Temp* material, which is easy to use. Lay it over your plan, trace the part, and score it with your hobby knife. Then flex it, and it will break cleanly along the scored line.

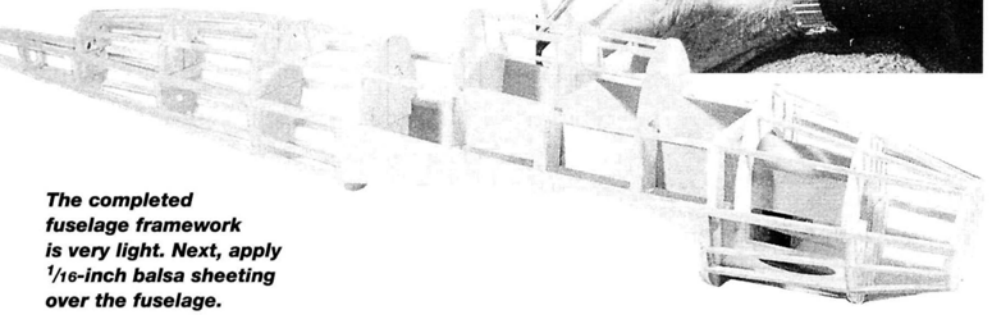
All the formers for the nacelles and fuselage, except the firewall, are made with 3/16-inch foamboard (from art-supply stores). Some of the formers are laminated with thin ply where additional strength is needed. Because the parts are made of foamboard, you must use white glue, epoxy, or foam-compatible CA. Foamboard can be cut either with a scroll saw or a hobby knife, and it never splits. Notches are best cut undersize; then you can press the stringers into place along with a little white glue for a very strong joint.



The nacelles are built upside-down over the plan. Use white glue, epoxy or foam-compatible CA to glue the foamboard.



Above: all of the formers are made from 3/16-inch foamboard. Where additional strength is needed, they are laminated with 1/32-inch ply. The foamboard is light, strong and inexpensive. Right: before you install the stringers, use a sharpened 3/16-inch music wire to make a straight line of holes through the fuselage formers for the elevator and rudder control cables.



The completed fuselage framework is very light. Next, apply 1/16-inch balsa sheeting over the fuselage.

The nacelles are assembled upside-down over the plan. Leave off the firewall until you are ready to attach the nacelles to the wing. Note that the right and left nacelle are different because of the wing taper. After assembly and before sheeting, trim the formers as indicated on the plan so that the nacelle fits snugly on the bottom surface.

Now build the engine-mount box out of 3/16-inch ply to accommodate your engine. Epoxy the box to the plywood firewall. The plan shows the mount box for the O.S.* .48 4-stroke engine. Epoxy

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

It is difficult to get two engines running at the same rpm. Try to get them within 500rpm at wide open throttle and even closer at idle. Be prepared to use plenty of rudder in the takeoff run to offset any difference in thrust between one engine and the other. Hold the tail down with up-elevator until you have plenty of speed, and then steer with the rudders. Don't lift off too abruptly, and climb out gently to keep airspeed up. If you lose one engine, few things are more difficult to control than a twin at low speed.

At any point in the flight, if you lose an engine, cut the throttle, push the nose down and head for the runway or the best landing spot.

The PZL-P38 has a pretty high sink rate, so keep some power on until you have crossed the end of the runway. Then reduce power gradually, flare and touch down on the mains. It will roll out straight.

• LOW-SPEED PERFORMANCE

The Wolf behaves OK at low speed with no tendency to snap at stall. At approach speeds for landing, it is stable and easily controlled.

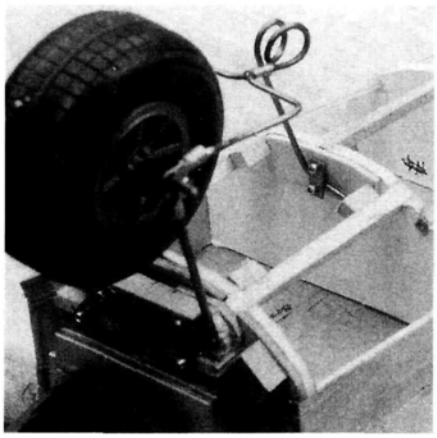
• HIGH-SPEED PERFORMANCE

The O.S. .48 4-strokes with 10x6 props furnish more than adequate power. As I mentioned earlier, I believe two, 2-stroke 25s or 32s would be OK. It climbs briskly, and once at altitude and in level flight, the Wolf is very fast. I usually fly at about 60 percent throttle. While not designed for aerobatics, the model easily does loops, stall turns and rolls. With its speed, it could do other aerobatics, but they would not be representative of the full-scale aircraft. A low-level pass with those two 4-stroke engines beating together is impressive and a sure crowd pleaser.

the hardwood landing-gear block to the firewall. You will need to enlarge the groove a bit with your Moto-Tool so that two pieces of 1/8-inch music wire can fit side by side in the groove. A couple of no. 4 wood screws screwed through the block and into the firewall add strength.

Next, epoxy the firewall to the front former of the nacelle, and sheet the nacelle with 1/16 balsa. Make a hatch in the bottom so you'll be able to get to the landing-gear fork attachment for installation/repair. Use blue foam to make the aft tip, and glue it to the nacelle. You are now ready to attach the completed nacelle to the wing.

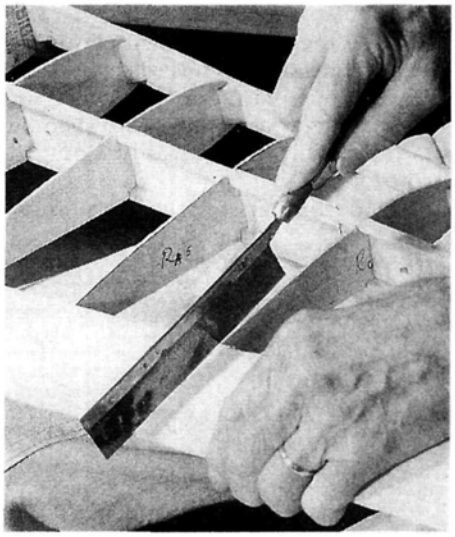
The nacelles are skewed outboard 2 degrees to minimize the yaw that results from an engine out. Measure the distances from the wing centerline to the nacelle center at both the LE and the TE. Mark these on your wing. Align the nacelle with these marks, and epoxy it to the wing. Cut out a little of the LE so that the firewall has a flat surface to be glued to. Complete the attachment by adding a strip of fiberglass cloth around the joint of the nacelle and the wing. Add the 1/64 ply fairing to blend the top of the firewall into the wing's top surface.



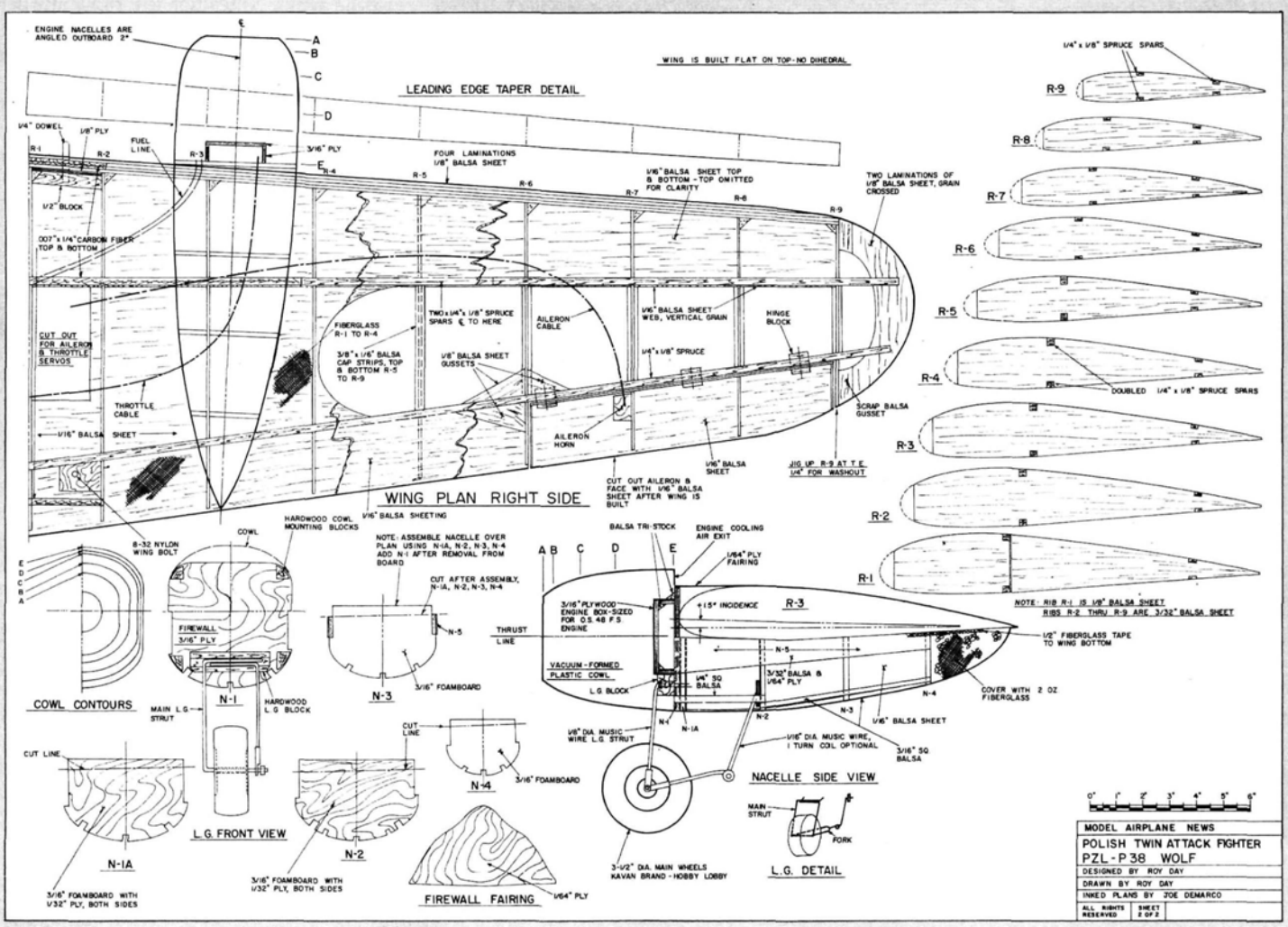
The main, torsion-type, landing-gear struts are held in a landing-gear block epoxied to the firewall. The aft fork provides additional support. The landing gear has worked well on many grass-field landings.

FUSELAGE

The lower half of the fuselage is built upside-down over the 1/4-inch-square longerons that are first laid down over the plan to form a crutch. Put in the bottom formers and the wing saddle. Again, the formers are made of foamboard, and a few are reinforced with 1/32-inch ply where loads are high. Before you glue in all the stringers, cut holes in the formers for your elevator and rudder pushrods and antenna. I



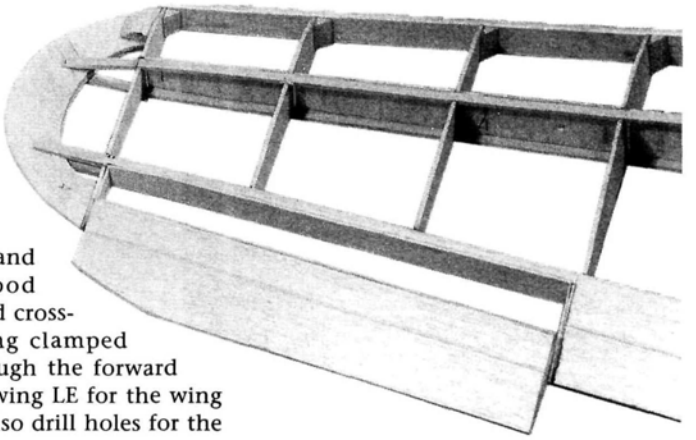
When the wing framing is complete, carefully saw out the ailerons and face them with balsa sheet. CA-type hinges work well.

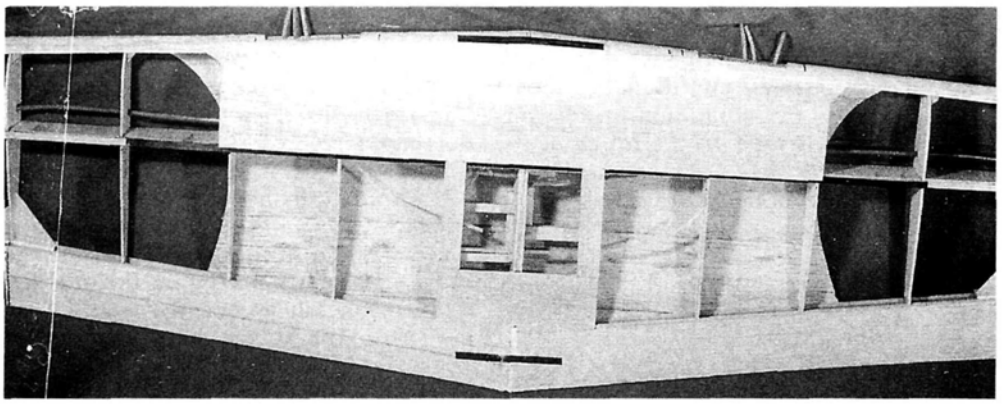


sharpened a piece of 3/16-inch music wire and used it to punch a straight line of holes through the formers.

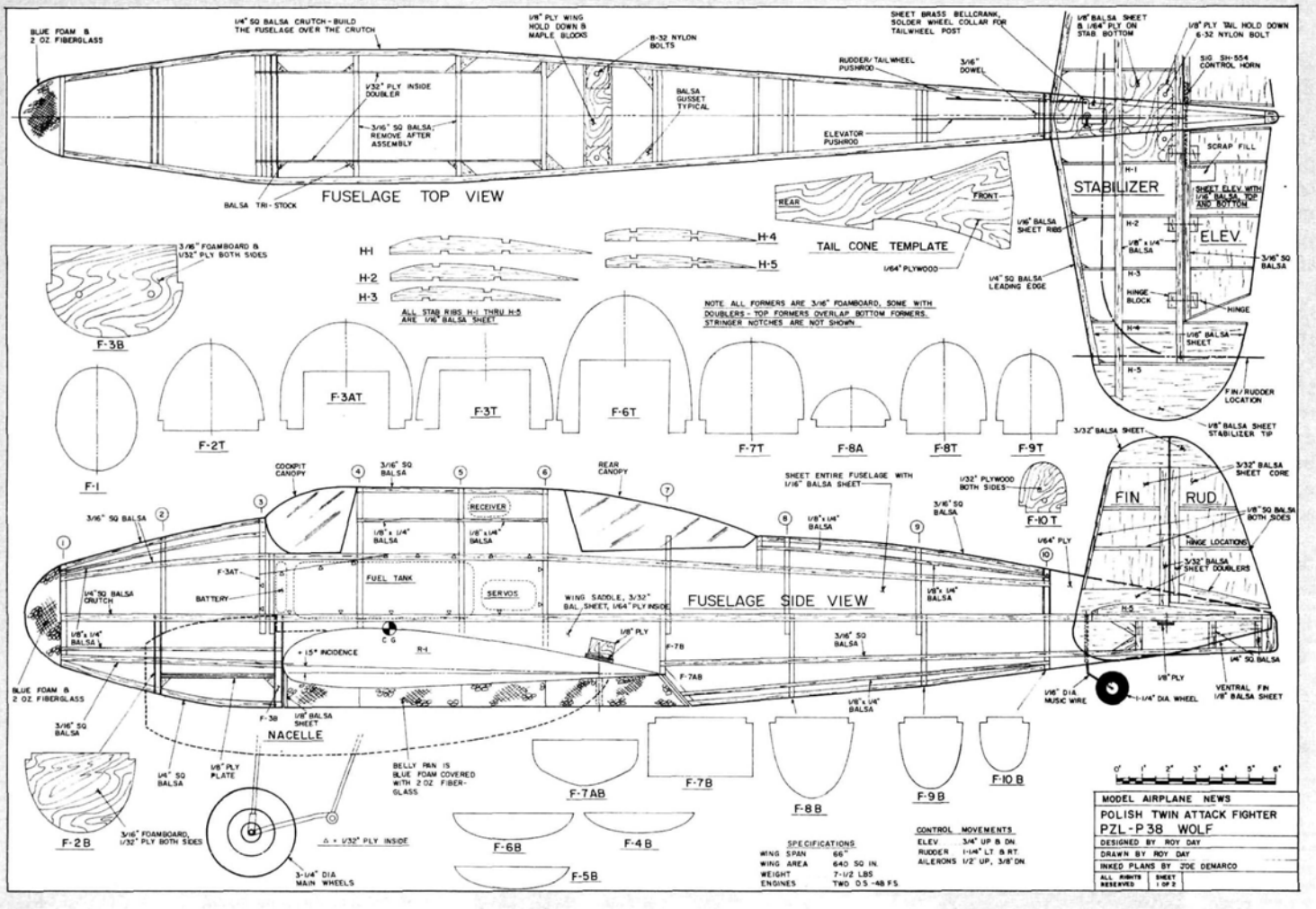
Remove the lower half of the fuselage from your building board and add the front former, F-1, and the remaining top formers. To strengthen the joints of the top and bottom formers, the top formers overlap the bottom ones. Before you add all the top stringers, put in the 1/32-inch-ply doubler. Reinforce both the ply doubler and the formers around the wing opening with triangle stock as shown on the plan. Once the fuselage framing is complete, you can cut out the 3/16-inch-square cross-braces that go across the wing opening. You'll need access to this space for the tank and servos.

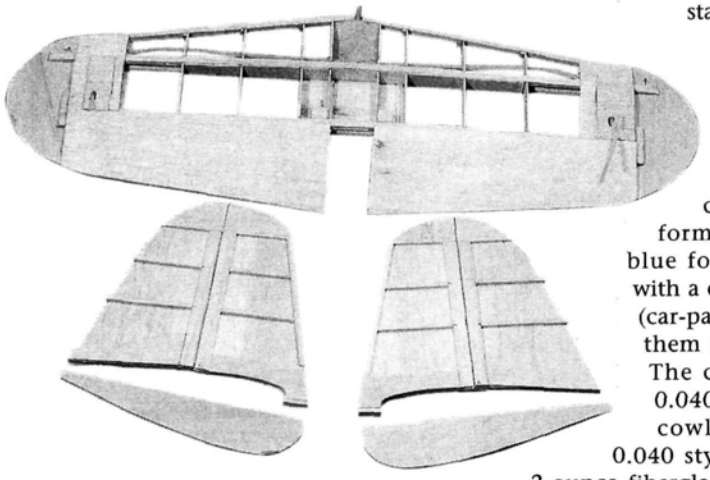
Trial-fit the wing and put in the hardwood hold-down blocks and cross-brace. With the wing clamped into place, drill through the forward former and into the wing LE for the wing hold-down dowels. Also drill holes for the





Above: the finished aileron is light and fits neatly on the wing. The wing spars extend to the laminated wingtips for strength. Note the triangle stock that supports the ribs against the LE.
Left: here is the partially sheeted wing with aileron control cables, two throttle cables and fuel and pressure lines running from each engine position. Be sure you get all this into place before you sheet the wing. The right and left fuel and pressure lines are connected to a T-fitting that is then hooked to lines from the fuel tank when the wing is joined to the fuselage.





The built-up horizontal tail houses the control cables for the twin rudders. The twin vertical tails with their ventral fins are shown with the bolt-on horizontal tail.

TE hold-down bolts. I use 8-32 nylon bolts threaded into the blocks.

Make a nose plug from blue foam, and cover it with 2-ounce cloth and resin. Glue in the cockpit floors. Next, plank the entire fuselage with 1/16-inch balsa. The fuselage has several areas of compound surfaces, so you need to plank in narrow widths and use the stringers as supports for the joints. The result will be a strong and light fuselage.

TAIL

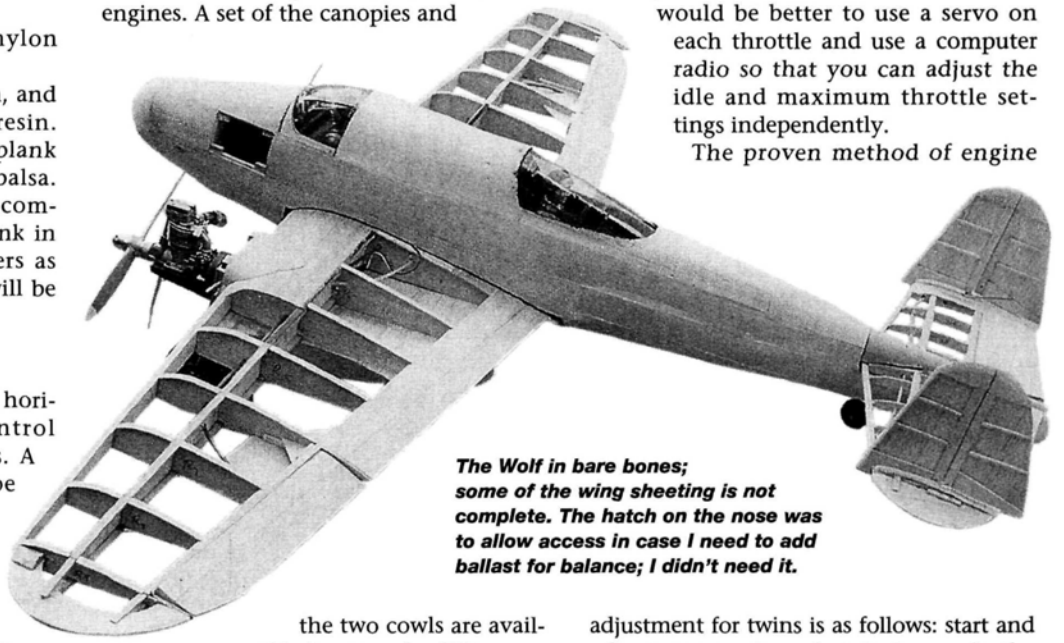
I used built-up construction for the horizontal tail so I can hide the control cables that go to the twin rudders. A simpler construction could also be used if you don't mind an exposed control linkage. The tail is bolted into place and uses a forward peg just like the wing attachment, and it works well.

The rudder pushrod operates a sheet-brass bellcrank that drives the twin rudder cables. The bellcrank is also connected to the tailwheel to provide steering. The elevator halves are connected by a Sig* center horn that extends downward into the fuselage. Build a hatch on the side of the fuselage opposite the elevator horn to allow access for adjustment.

Each of the twin vertical tails is made in two pieces: the upper vertical and the lower ventral. Mount them on the horizontal stab, and provide additional support by making a fillet of triangle stock on both sides.

FINAL ASSEMBLY

The cowls and the canopies are vacuum-formed. I made plugs from blue foam and finished them with a couple of layers of Bondo (car-patching material) to give them a hard, smooth surface. The canopies were made of 0.040 clear Vivak, while the cowls were formed out of 0.040 styrene plastic lined with 2-ounce fiberglass and resin. To reflect heat, I also put aluminum furnace/air-conditioning tape on the inside of the cowls where they are close to the engines. A set of the canopies and the two cowls are available from me for $25.



The Wolf in bare bones; some of the wing sheeting is not complete. The hatch on the nose was to allow access in case I need to add ballast for balance; I didn't need it.

Although its shape is a little different, the main strut is a regular torsion gear (two pieces) like those most often used in a wing. The aft fork provides additional support. The landing gear have proven to be very strong during many landings on a rough grass field.

To have room for the central tank, the elevator and rudder servos are mounted toward the rear of the wing opening. The battery can be moved forward for balance, if necessary. The former at the wing LE is open, so you can put the battery or ballast forward into the nose if you need to. If you think you'll have a tail-heavy plane, provide a hatch in the side of the nose so that you'll easily be able to insert ballast.

As mentioned earlier, the fuselage has some compound curves that make it difficult to cover. I used "aluminum" Oracover from Hobby Lobby*, and it was hard to get a good finish on certain areas. I like the Oracover, and it worked well on the wing, but I think I would paint the fuselage next time.

ENGINE ADJUSTMENTS

I try to get the engines within about 500rpm of each other, and setting them up for the first flight took some time. I use a single servo to drive both throttles, so all adjustments have to be mechanical. It would be better to use a servo on each throttle and use a computer radio so that you can adjust the idle and maximum throttle settings independently.

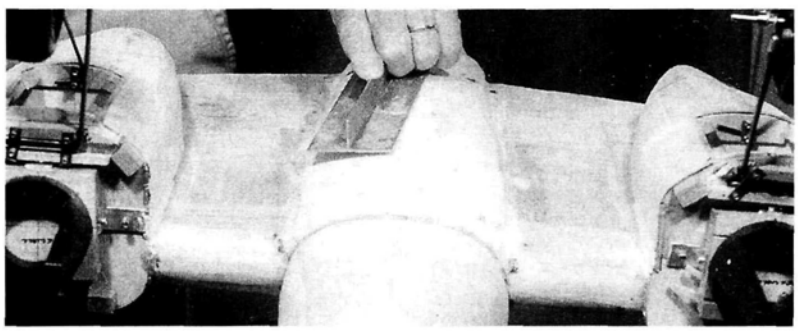
The proven method of engine adjustment for twins is as follows: start and adjust one engine. shut it down; do the same with the other engine; refuel if necessary; get both engines running, check the rpm with a tach, and you're ready to fly.

I had two engine-outs that led to my model's being damaged, so I did some engine testing both on and off the airplane. Apparently, the Cline fuel-regulator system that I used supplies more fuel to the carburetor than is normal. I drilled out (enlarged) the air-bleed hole in the carbs because they needed more air to get a proper fuel mixture at idle. With this improvement, my engines have been much more reliable.

The PZL-P38 has good flying characteristics and presents a good challenge. If you like unusual aircraft with pleasing lines, the Polish PZL-P38 Wolf just might be for you.

If you have any questions or need to order parts, contact me at 11709 Magruder Lane, Rockville, MD 20852; (301) 468-0915; fax (301) 770-2616.

*Addresses are listed alphabetically in the Index of Manufacturers on page 134.



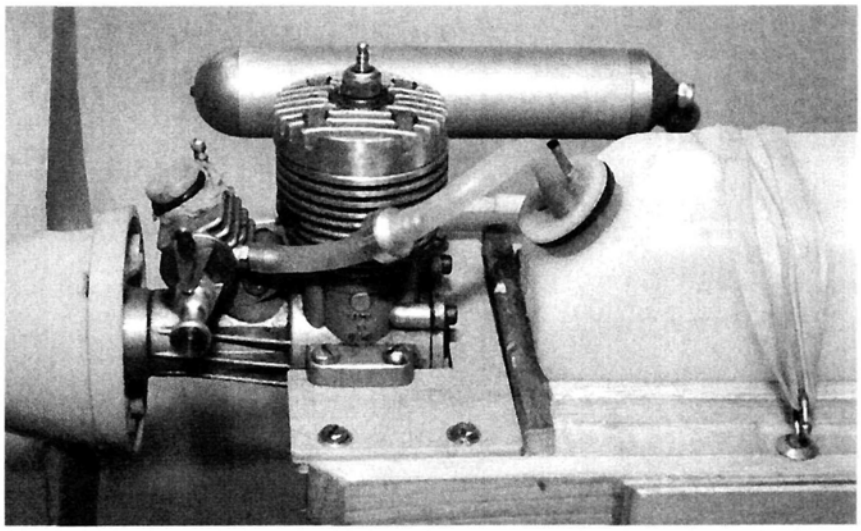
The blue foam belly pan is shaped while in place on the assembled plane. It is then covered with fiberglass cloth and resin.

WWW.SRBATTERIES.COM

Everytime we sit down to do a new ad, we don't know where to begin. If we do an ad about our battery packs, people call wondering if we're no longer making kits or publishing *R/C Techniques* and *Electric Flight Techniques*. If we do an ad about our kits, people think we're no longer making battery packs for modelers or that we've stopped pubishing *Techniques*. It often seems like there's no right way to keep you informed about what's new at SR Batteries. • Well, all of that has changed! Thanks to the world wide web, WWW, we can now not only keep you up to date, we can keep you up to the minute! If we release a new kit, you'll read about it two or three *months* sooner at srbatteries.com . If we release a new *Techniques* volume, you'll read about it two or three *months* sooner at srbatteries.com . And finally, if we release a new cell or technical information about one of our packs, you'll read all about it *first* at srbatteries.com! Naturally, our site lists pricing and technical information covering all of our products. You'll find the sizes and weights of all of our packs and individual cells as well as photos, specifications, and descriptions of our ARF and laser cut kits. In addition, there's a detailed index to all of the volumes in the *Techniques* library. • SR Batteries, Inc., Box 287, Bellport, NY 11713, Phone: 516-286-0079, Email: info@srbatteries.com

An engine mount is a device that attaches an engine to a model, and several of their features bear consideration: mounts can be scratch-built or purchased; each approach has its good points.

One of the best features of electric-powered models is the simplicity of their motor mounts. Electric motors are, in themselves, relatively vibration free, but do remember to balance the propeller. This article will not address electric motor mounts.

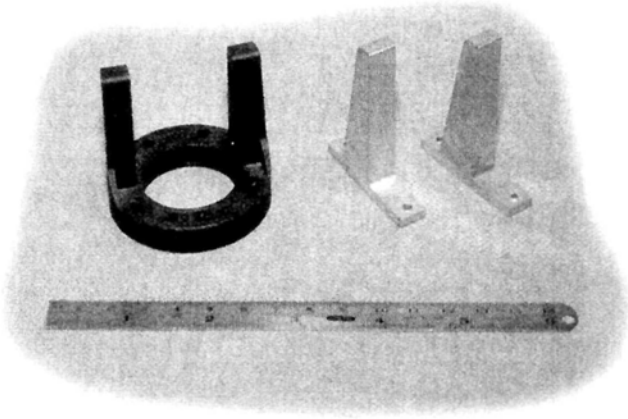


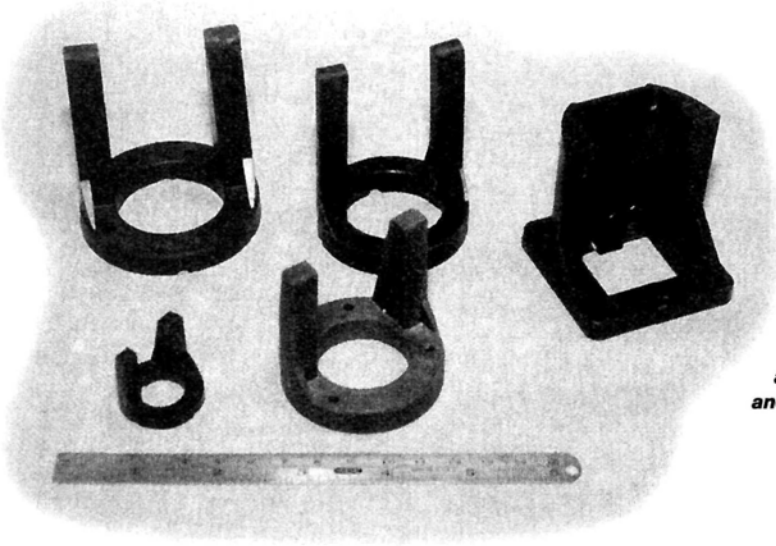
The nose of this stick-type model illustrates the use of a shear plate to minimize crash damage. This plate is the model's third; the first two were wiped out in crashes. The engine survived with minor damage, and the airframe was easily repaired.

Advice to consider

Engine-Mount Basics

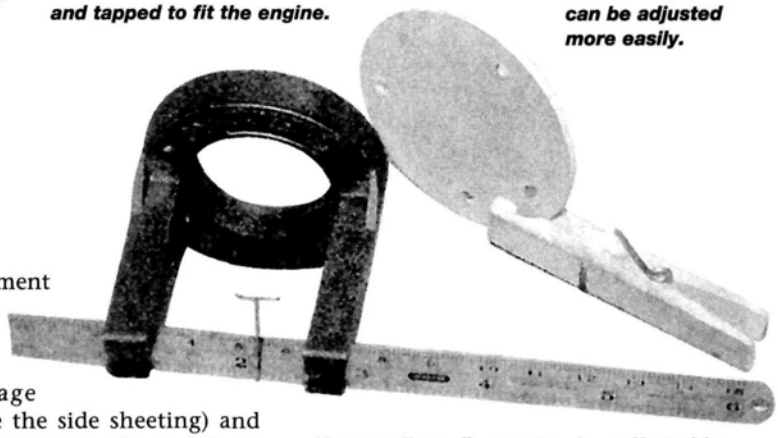
by George Wilson Jr.





Left: several plastic firewall mounts. Note the wide range of sizes and lengths. Aluminum mounts are similar and are also available in many sizes. Some firewall mounts have built-in nose-gear mounts. With a few exceptions, a firewall mount must be drilled and tapped to fit the engine.

Above: firewall mounts can be one- or two-piece. The two-piece types are easier to drill and tap and can be adjusted more easily.



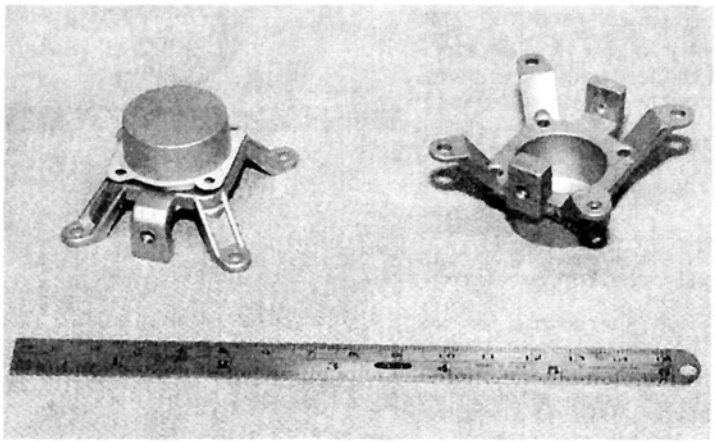
Above: a firewall mount and an offset shim that goes between it and the firewall. The shim does not need to be round. This one was shaped on a sander and tack-glued to a piece of wood that served as a handle during the shaping. While you're at it, make two or three different ones so you can try different offsets. Offsets can also be added using washers between the mount and the firewall.

TYPES OF MOUNT

• **Beam mounts.** These classic engine mounts date back to the 1930s and consist of two beams (typically, 3/8x1/2-inch maple or similar hardwood) that are spaced to accept the engine lugs. The beams pass through and are glued to the firewall, rear tank compartment bulkhead and the bulkhead under the leading edge of the wing. They are usually mounted at a negative angle to provide downthrust when it is needed. The beams unite the fuselage's front end assembly into a strong structure.

A later development was to increase the beam spacing (usually to the full fuselage width just inside the side sheeting) and install a shear plate across the top, front ends of the beams. The shear plate is cut out to accept the engine crankcase and to provide horizontal engine offset (upthrust and downthrust). The shear plate is intended to shear off during a crash and thus minimize damage to the engine.

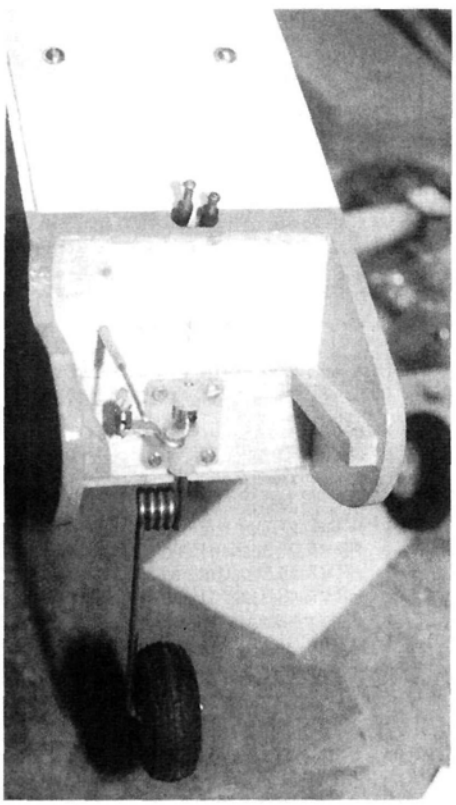
The shear plate is made of thin aircraft



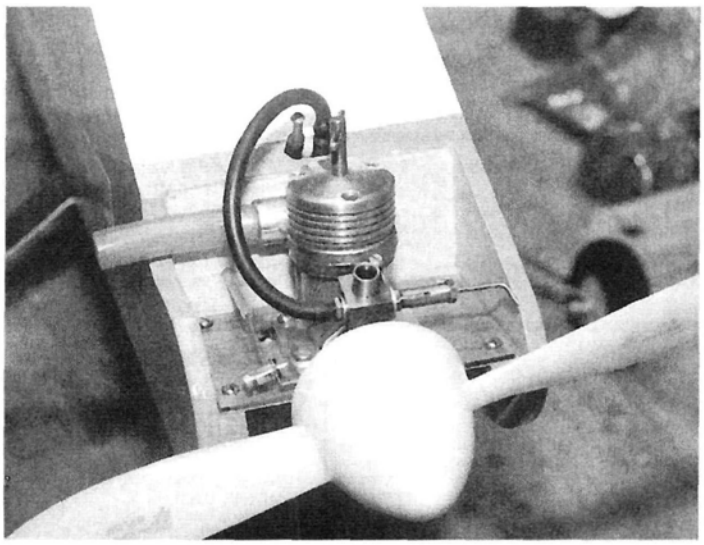
A pair of K&B radial mounts (sometimes called "spider mounts") replace the rear crankcase covers on my .28-size K&B Sportsters. They include holes for mounting the nose gear. Because they are symmetrical, I can easily make offset adjustments using washers between them and the firewall.*

plywood or plastic, such as Micarta, and mounted on the beams and engine lugs with machine screws and nylon aircraft locknuts. Nose weight, if needed, can easily be added by installing sheet lead (flashing) strips between the screws that hold down the front of the shear plate. Use additional locknuts to secure the lead.

The engine and tank compartments should be thoroughly fuelproofed with thinned epoxy or a polyurethane varnish. Note that the structure can be made using an aliphatic-resin glue, such as Titebond* or Sig-Bond*. These are strong, fuelproof and easy to use.



A beam mount with the engine and shear plate removed to show the nose gear. Note that the beams are attached to the fuselage sides to help strengthen the nose section of the airframe.



Here is a typical beam mount with a shear plate that allows the engine to break free during a crash. This frequently saves both the engine and the airframe from extensive damage. Make two shear plates when building; you may never use the second one, but it's good insurance. The engine is a PAW Diesel mounted in my Scratchy model.

Beam and shear mounts are strong, and they are easily modified for different offsets and even different engines.

• **Firewall mounts.** Molded, glass-filled, plastic and cast-aluminum mounts that are attached to the firewall with blind nuts are very popular. Most are one-piece, but some are two-piece so the spacing can be changed to accommodate different engines. Some engines come with custom mounts attached to their crankcases and are attached to the firewall with screws and blind nuts. These are frequently called "radial mounts" because they are similar to the struts used to mount full-scale radial engines.

Firewall mounts are made and distributed by several companies including Dave Brown*, J'Tec*, Sig and CB Tatone*. They come in various lengths and sizes to fit many different cowls and engines.

Offsets are best added by making tapered hardwood shims that fit between the mounts and the firewall. Offsets can also be made by inserting washers under the engine lugs and/or between the mount and the firewall.

Firewall mounts usually have to be drilled and tapped to fit the engine. J'Tec markets pre-drilled mounts for a number of popular engines. I have been known to file flats on the bottom of the mounts and use machine screws and locknuts to hold the engine. Du-Bro* recently introduced an adjustable engine mount that includes a drill guide/marker and other goodies. Drilling and tapping the mounts takes some "hold your mouth right" type work, but these mounts are strong and do the job well.

VIBRATION ISOLATION

Vibration caused by the engine and propeller can be isolated (not eliminated) by using soft rubber mounts between the engine and the mount, or between the mount and the firewall. Isolation reduces the vibration transmitted to the airframe and helps preserve the airframe and the electronic components, including the battery. Soft mounts (typically by Sullivan*) are frequently made of rubber with screws attached to their ends. Others are rubber grommets that encircle the screws that are attached the engine or the mount. Vibration isolation also helps to reduce noise by reducing the vibration, but the noise reduction is minimal in .60-size and smaller models.

Single-cylinder engines are balanced internally to minimize vibration, but complete balancing is inherently difficult, if not impossible, at all engine speeds. Multi-cylinder opposed engines lend themselves to much better internal balancing. Propellers can and should be carefully balanced to minimize vibration.

CONCLUSION

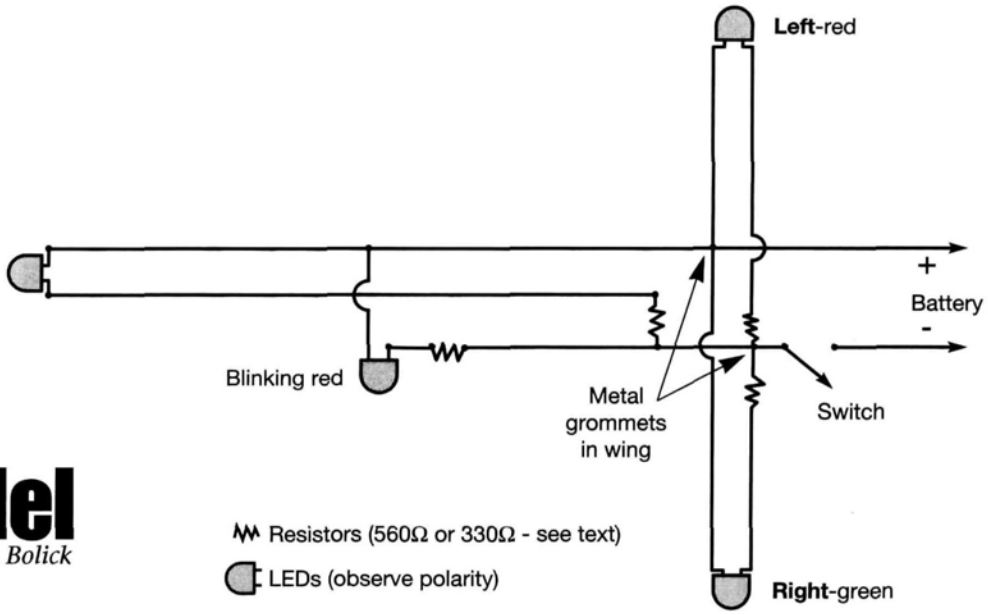
I prefer to use beam mounts with shear plates. The mounts are rigid and easily adapted to other engines. Offsets are easy to make (and change), and they are inexpensive.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

Add Running Lights to your model

by Glenn Bolick

Let's light it up!



With all the emphasis on building more and more scale-like models, one of the least expensive and easiest to implement—but least often done—scale features is running lights. With today's LEDs, it's not difficult. All the components can be purchased for less than $10 at any RadioShack or electronics store. Further, installation is simple and quick.

MATERIALS

RadioShack part numbers

LEDs	Small	Large
Red	276-310	276-214
Green	276-303	276-215
Yellow	276-021	276-205
Blinking red	276-036	RSU10524437
Resistors		
560 ohm	271-1116 (for over 6 volts)	
330 ohm	271-1113 (for 6 volts or less)	
Switch	SPST sub-miniature 275-406	
Wire	24-gauge stranded 278-1301	

Grommets, blind nuts and screws are available from hobby shops and hardware stores. Use sizes to suit your aircraft.

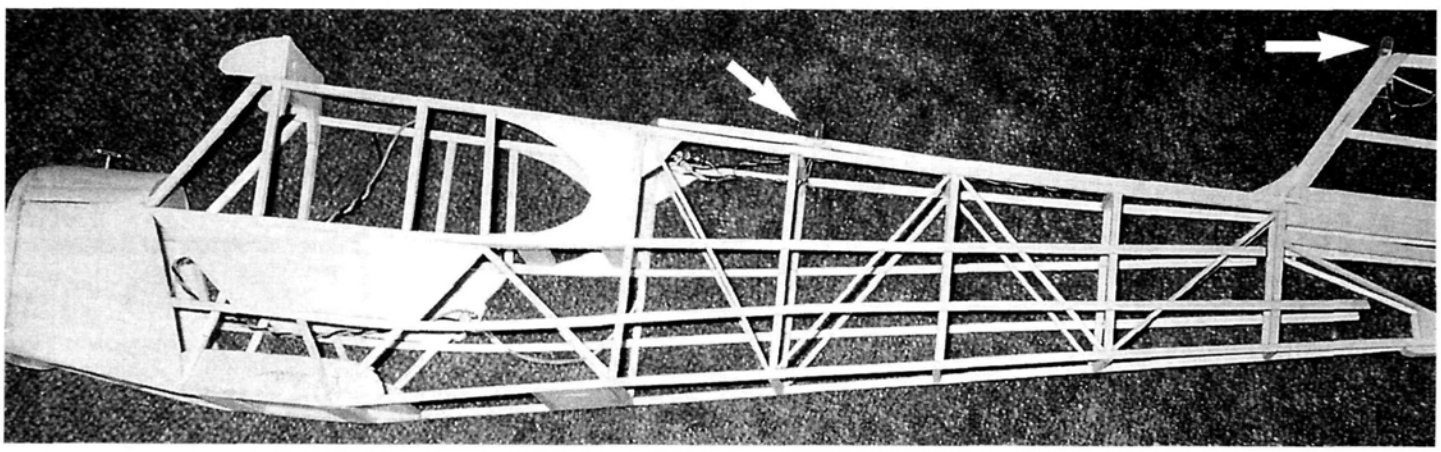
Photo 1 shows the necessary components: wire, resistors, LEDs and a switch (not shown are grommets, blind nuts, wing-attachment screws and solder). Photo 2 is a view of a framed-up ½A Hobby Lobby Super Cub with a blinking red beacon LED on top of the fuselage and another on top of the rudder. Photo 3 shows the green LED mounted to the right wingtip, while photo 4 shows the resistors and grommets wired to make the wing's electrical connection.

Photo 1: the major components are available from RadioShack.

To get power to the wing, the battery is connected to the wing hold-down blind nuts via the switch in the fuselage. Metal grommets are embedded in the wing and used to continue the connection to the wing. Solder the left and right LED leads to two grommets through which metal screws are used to mount the wing. In this way, current may flow through the blind nuts and into the wing circuit to light the wing LEDs. The LEDs mounted on the fuselage are connected in parallel. For a plane this size, 4-40 bolts and blind nuts are appropriate, as are the smallest grommets I could find at the hardware store. Use larger hardware for larger planes.

See the schematic for wiring details,

Photo 2: here, the blinking beacon and rudder LED are visible.



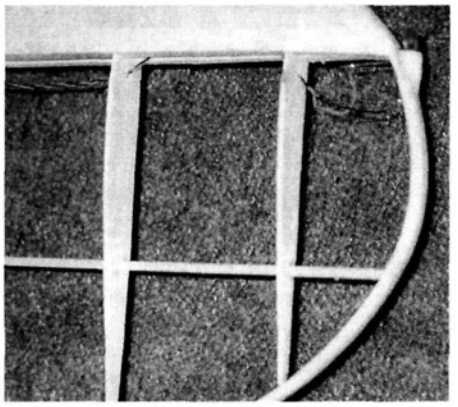


Photo 3: the installation of the wingtip LEDs is straightforward; the balsa housing should be made to suit the particular aircraft being modeled.

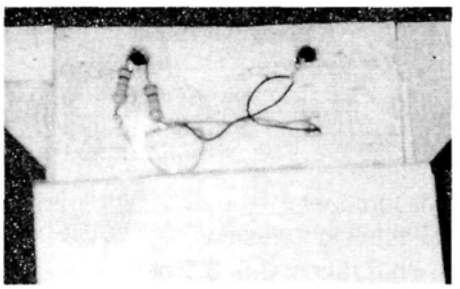
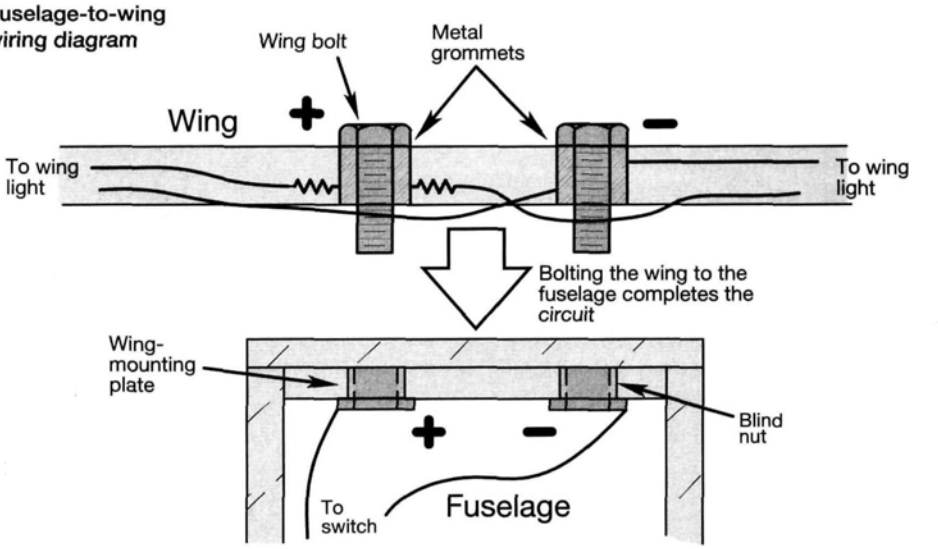


Photo 4: the metal grommets are glued into the wings after the wires and resistors have been soldered to them.

and note that each LED has its own resistor wired in series to limit current flow to specified levels. My Cub is electric-powered, and the motor power battery is wired to the switch and provides the necessary power to energize the LEDs. For glow-powered planes, a 9V cell or other battery source must be installed. When 9 to 12 volts are applied, 560-ohm resistors must be used in each LED line. If, on the other hand, 4 to 6 volts are used, 330-ohm resistors are more appropriate.

Note that a yellow light is specified for the rudder, as RadioShack does not stock the white LEDs that are preferred; the effect, however, is the same. I think you'll find that the comments you get on the field will more than justify the little time required to do this installation.

Fuselage-to-wing wiring diagram

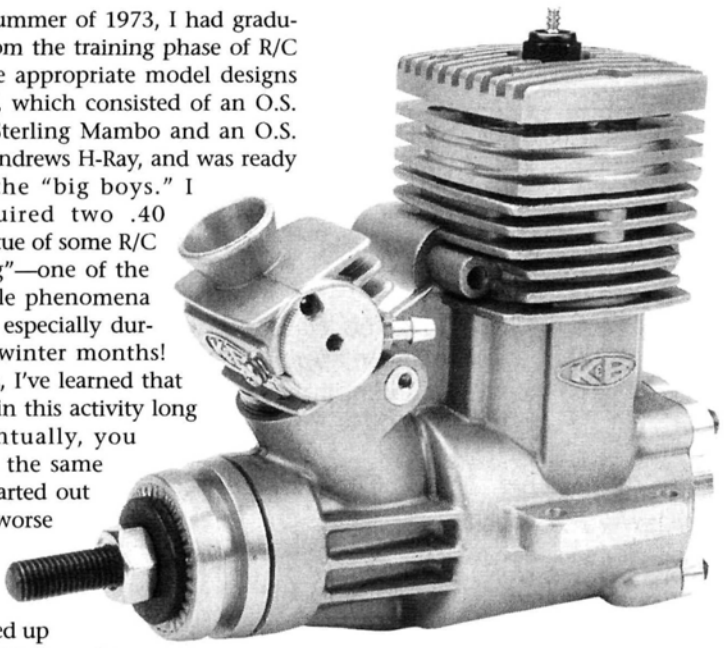


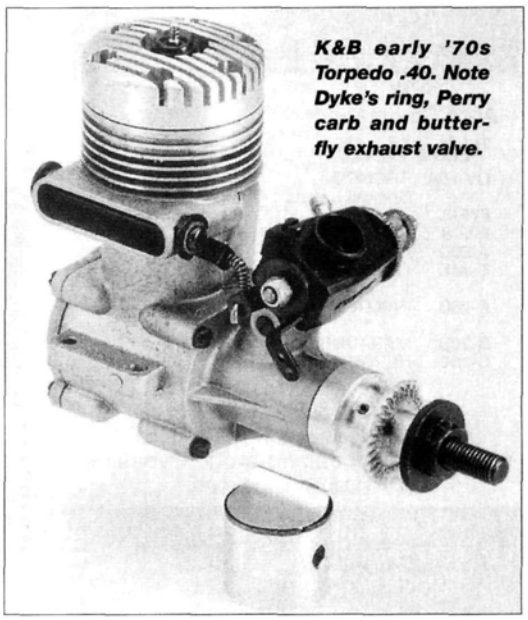
by Chris Chianelli

K&B .48 R/C

An all-out effort for us sport/pattern flyers

By midsummer of 1973, I had graduated from the training phase of R/C and the appropriate model designs thereof, which consisted of an O.S. .15-powered Sterling Mambo and an O.S. .19-powered Andrews H-Ray, and was ready to fly with the "big boys." I quickly acquired two .40 engines by virtue of some R/C "horse trading"—one of the more enjoyable phenomena of our hobby, especially during the long winter months! Over the years, I've learned that if you engage in this activity long enough, eventually, you wind up with the same stuff as you started out with—but in worse condition!

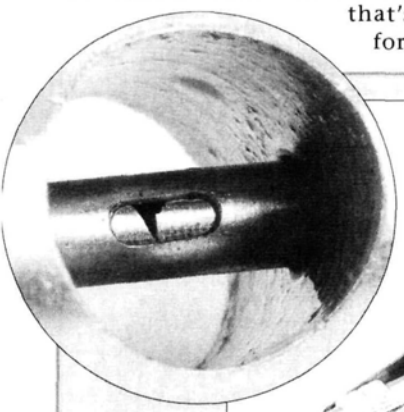


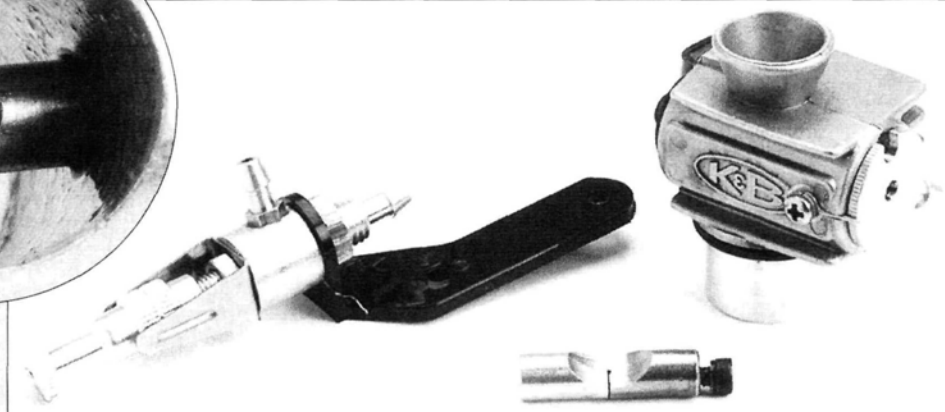


K&B early '70s Torpedo .40. Note Dyke's ring, Perry carb and butterfly exhaust valve.

Anyway, one of the two .40s I ended up with was a K&B* Torpedo .40. The other was a Webra Black Head, but that's a story for another day. For you old-timers, I will tell you the Webra ended up in a Top Flite Contender, and the K&B ended up in an Andrews Sport Master that lasted a whole two flying seasons! Considering the radios of back then and my lousy flying ability, indeed a major stroke of luck.

The Torpedo featured twin ball bearings, break-away prop shaft, Dyke's ring, Perry carburetor, an exhaust but-





Above: the all-metal carburetor features a twin-tube-type spraybar; inset: the inner tube has a tapered spray orifice, and the outer tube has an oval window that exposes more or less of the tapered orifice as it rotates with the throttle barrel. The adjustment disk on the end of the carb rotates the inner tube to expose varying amounts of tapered orifice, thereby adjusting mid-range and idle mixtures. Two other nice features are the remote high-end needle valve (a fantastic safety feature) and the split drawbar that holds the carb in the crankcase superbly.

Right: externally, K&B has done a really nice job on the crankcase's die-casting. Even nicer is the pristine CNC machining on the internal surfaces. An O-ring is used for superior backplate/crankcase sealing in place of the more common paper gasket that can tear during disassembly.

terfly valve (which was a real pain because mufflers were required at my field, even back then), loop-scavenge porting (Schnuerle ported had yet to emerge) and piston-skirt porting—the latest performance advancement at that time; in fact, the Torpedo sported two!

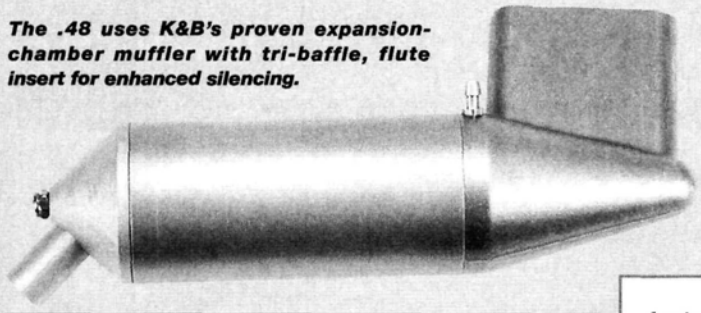
Gone is the Torpedo name, but the same basic 30-year-old design is still produced, albeit in ABC form, and is simply called the K&B .40. Sometimes, good performance engines of yesterday make good sport engines today. The K&B .40 is such a case.

While K&B has remained one of the leaders in pylon racing, boat racing and ducted-fan arenas, its sport/pattern achievements over the past decade have, in my opinion, been somewhat more dubious. However, the recent introduction of the K&B .48 R/C has removed any question, at least in my overactive mind, that K&B is not only back but is right on track in the sport/pattern market. This engine's design and manufacturing execution look right. From what I've heard, the price is right, too.

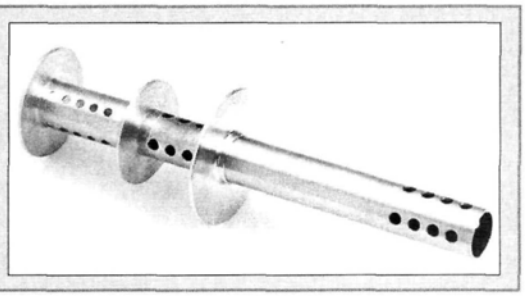
K&B claims a healthy 2hp at 15,000rpm, and in this quick first look, I can't confirm or dispute those figures. But we've asked our very own, Dave "Dr. Dyno" Gierke to put the .48 R/C on his "top-priority" list for analysis in his laboratory.

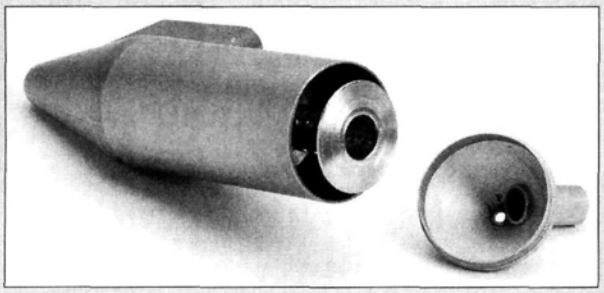
I have to plead guilty to a severe case of nationalistic pride and confess I find it heart-warming to see an American manufacturer put forth such an admirable effort—one that shows considerable promise in both the quality and power-for-your-dollar areas.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

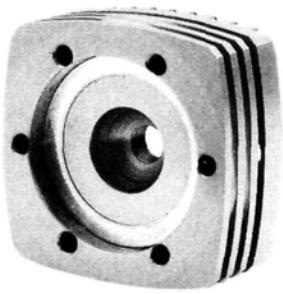


The .48 uses K&B's proven expansion-chamber muffler with tri-baffle, flute insert for enhanced silencing.

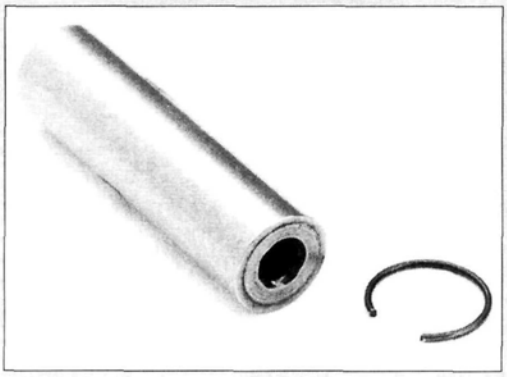




The piston and sleeve are true chrome, ABC design. Note the three oil grooves in the piston; they promote sleeve lubrication throughout the entire stroke. The wristpin is accessible through one side of the piston and is held in with one C-clip. The conrod, which is machined form billet stock, sports bronze bushings at both ends and one oil hole at the top end and two at the bottom (neither is visible here).



Reminiscent of Super Tiger, the head was designed to capture both the crankcase flange and the sleeve flange. Note the small, deep, hemispherical combustion chamber and generous squish-band area.



AEROBLEND

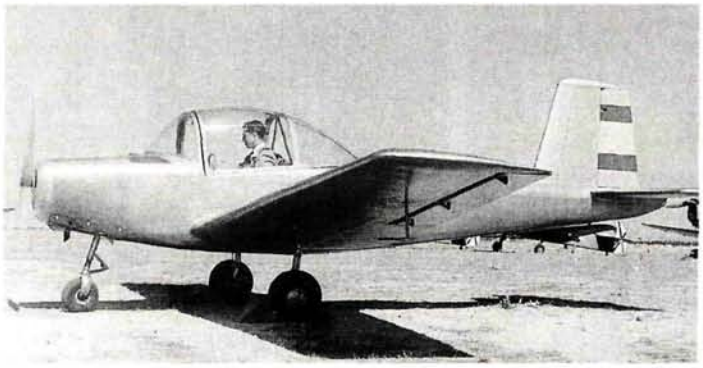
With the fuel market having taken some disquieting hits this past year, I thought I'd let you in on a new fuel from an extremely stable source. It's Hangar 9's new AeroBlend. On talking with Horizon Hobby*, the distributor, I found their philosophy on fuel seems to be that there's no magic formula to good fuel—just high-quality ingredients mixed accurately. I concur fully. It is that simple. Horizon states a commitment to the integrity of the components and not to cut the proportions of the mix.

AeroBlend is available with 10 percent and 15 percent nitro and, while not stated on the label, Horizon is happy to make the oil content public (thank you!)—an 18-percent mix of synthetic and castor with the majority being synthetic; a smaller amount of castor is thrown in for extra corrosion and over-lean protection. These are the proportions I prefer for both my 2-stroke and 4-stroke engines.

PLANES WORTH MODELING

3-View Documentation for Scale Modelers

Iberavia I-11 Peque

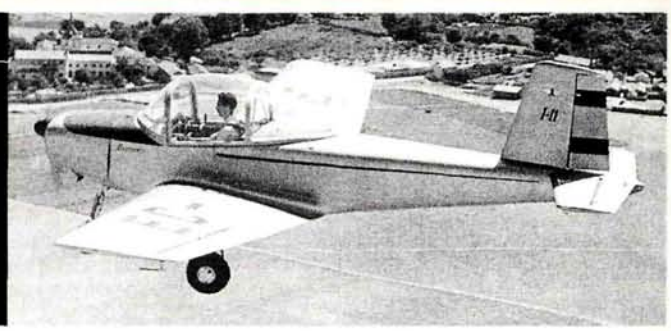


Looking for a unique model to bring to the field? This low-wing Spanish two-seater offers good moments, generous dihedral and a big bubble canopy that isn't too detailed. Designed by the Iberavia S.A. company and constructed by Aeronautica Industrial S.A. (AISA), the prototype I-11 Peque first flew in 1950. It was powered by a 90hp, 4-cylinder Continental engine spinning a two-blade, fixed-pitch wooden prop, and it featured an all-wood, monocoque structure and two-spar, wooden wings and fixed tail surfaces with plywood skins. Its differentially operated ailerons and movable tail surfaces had wooden frames and leading edges and were covered with fabric. The elevators had trim tabs, and the rudder tab had to be adjusted on the ground. Although the I-11 never went into production, a tail-dragger version, the I-11B, was developed from it. Designated as L.8C, this airplane was used for liaison and training duties in the Spanish Air Force.

—Debra Sharp

SPECIFICATIONS

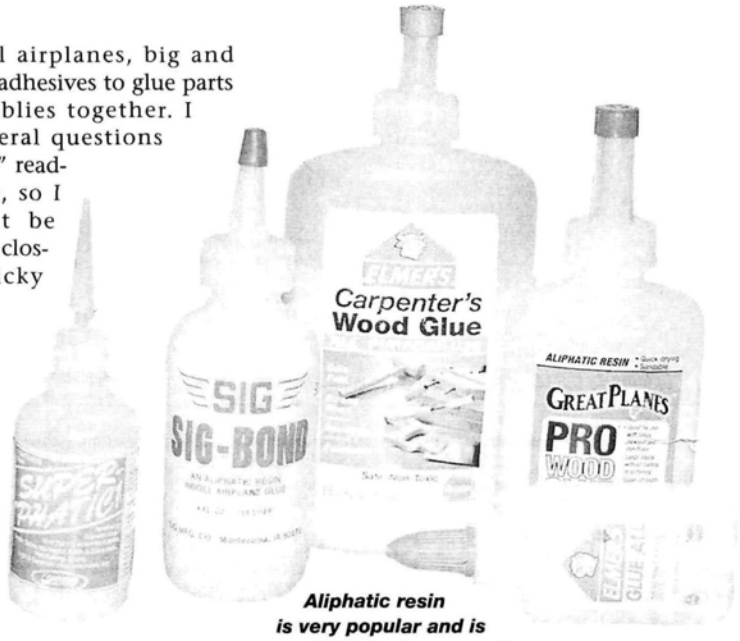
Name: Iberavia I-11 Peque
Type: two-seat light training/touring monoplane
Wingspan: 30 ft., 7 in.
Length: 21 ft.
Height: 7 ft., 10 in.
Weight: 1,012 lb. (empty)
Maximum speed: 122mph
Minimum speed: 53.4mph



THINKING BIG *by Gerry Yarrish*

Glue—a sticky subject!

To build model airplanes, big and small, we need adhesives to glue parts and subassemblies together. I have received several questions from "Thinking Big" readers about glue use, so I thought it might be helpful if we took a closer look at this sticky subject.



Aliphatic resin is very popular and is available under several brand names. Most of the time, I use Elmer's carpenters' wood glue, as it is inexpensive and readily available.

Epoxy adhesives come in two parts that must be mixed in the correct proportion (usually 50:50) to cure properly. Epoxy is available in formulas that cure at a variety of rates: 5-minute, 30-minute, 3-hour, etc.

GLUE TYPES

The three most popular glue types are cyanoacrylates (CA), or "instant" glues, slow- and fast-setting epoxies and aliphatic resins (yellow carpenters' glue).

• CA comes in "thick," "medium" and "thin viscosity" and is used for general parts assembly; in fact, you could assemble an entire model using only CA if you wanted to do so. CA is easy to use and very strong, and most brands come with their own spray accelerator, or "kicker," that greatly speeds the gluing process.

Thick and medium CAs are used for most assemblies in which you apply glue to one part and then bring it into contact with another part. Thin CA penetrates (flows) well and is used where two pieces are brought into contact with each other and the glue is then wicked into the seam. With experience, modelers develop their own building techniques and use the CAs they're most comfortable with.

Many prefer an odorless CA because its vapors do not irritate the eyes and it does not attack foam. Though CA is versatile, it is fairly expensive and many have developed allergic reactions to it.

Right: if you use CA, you'll want to use an accelerator, or "kicker," to speed construction. CA usually comes with its own brand of spray accelerator.
Below: cyanoacrylate (CA) glue is perhaps the most popular. Available in many formulas, CA is for general-purpose gluing; if you wish, you can assemble an entire model using only CA.

• **Epoxy** glues are two-part adhesives that must be mixed before use. Most are very thick and very sticky; they stay where you put them and run very slowly. Epoxy doesn't dry; it cures. When the two parts are mixed together in the correct proportions, a chemical reaction takes place.

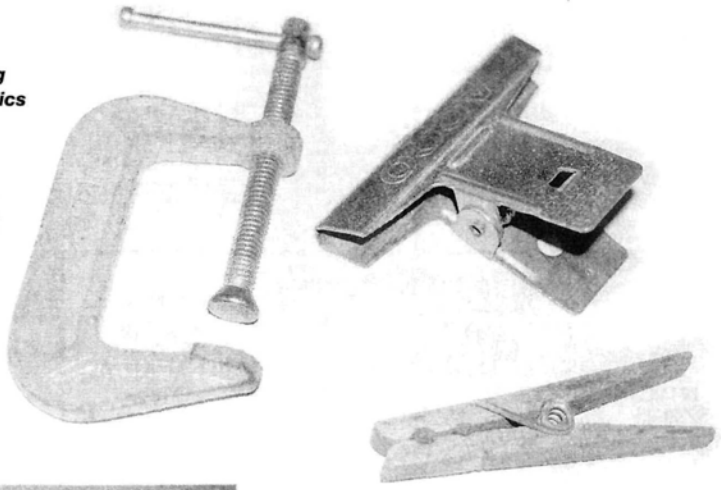
Epoxies are available in several viscosities and with different curing times, typically five, 15, 30 and 60 minutes as well as two and four hours.

Areas of a model that typically need epoxy are the firewall, landing-gear mount plates, wing-panel attachment points and dihedral brace. Epoxies' longer curing times give epoxied joints great strength. By curing over a longer period of time, the epoxy soaks more deeply into the pores of the wood surfaces being bonded together.

Slow-setting epoxy also gives you additional time to make sure the parts are in proper alignment. Though epoxy is very strong, it is also the heaviest adhesive, so to keep your model's overall weight to a minimum, use it only where it's really needed.

Left: specialty glues come in all forms. PFM is great for gluing together smooth plastics and other non-porous materials; it can be removed later if need be. Epoxy Plus is very thick and can be used to form fillets.

Right: when you glue parts together, it's important to consider clamping; you'll find these simple but effective "clamps" very useful.



• **Aliphatic resins**, or "yellow glues" (Elmer's Glue, Titebond, Wilhold, Pica Gluit, etc.), are the most common and are used by handymen and hobbyists. They're inexpensive, almost odorless and will set up in only a few hours. Most aliphatic resins are water-based so can easily be cleaned up with a damp cloth or a paper towel. Don't use Elmer's white glue when building models, as it is much less water-resistant than the yellow carpenters' variety.

When you use one of these glues, you have to either weight down or pin the parts together while it dries. This is good because if you screw up a part's alignment, you can easily reposition it before it's too late. Though referred to as "yellow" glues, several of the newer aliphatic glues are white.

When building traditional model airplanes (balsa and plywood), I like to use a combination of all these adhesives to take full advantage of their differing properties. I use CA to assemble most of a wing structure, but I switch to aliphatic resin to attach the wing's leading- and trailing-edge sheeting.

Above: canopy glue is white and specially formulated to stick to plastics. Available from several sources, all seem to have "56" in their names. All the brands are easily cleaned up with water, they dry clear and remain flexible.

Below right: aliphatic resin such as Sig Bond is great for gluing wing sheeting. It has a longer drying time than CA, and that gives you time to position the parts accurately. It also "sands" nicely.

Anchor Seal's* Anchor Bond epoxy comes in these great dispensers that make it easy to use: just pump it out and mix it.

SPECIALTY GLUES

Several glues do not fall into my three basic groups: PFM from IMP*, Zap's* Zap-a-Dap-a-Goo and "Goo" and "Goop" types of glue are very useful.

These thick, clear adhesives seem to stick to everything from glass and steel to plastic, fiberglass and plywood. You can even use them to glue servos inside fiberglass fuselages and not worry about them coming off. But when you want to remove a servo, this glue can, with some effort, be removed with a sharp knife.

I also use this type of glue to install fuel tanks. Goop sticks very aggressively to the slick plastic most fuel tanks are made of, and if you apply a very thick bed of it to set the tank into, it provides a fair amount of vibration damping.

The white glue known generically as "canopy glue" is one of the very best glues for attaching a clear plastic canopy to your model. It dries clear and stays rubbery while securely holding smooth plastic such as butyrate, styrene, ABS and vinyl. Several companies make a canopy glue, including Pacer Technology* (Formula 560), Wilhold (R/C-56) and J&Z Products* (Super R/C Z 56).

When using this type of glue, you do not have to cut away your covering material to obtain a good bond; it will happily bond the canopy directly to your MonoKote or Ultracote finish.

Another type of specialty glue is what's referred to as a "filled" epoxy. Carl Goldberg Models (CGM*) Epoxy Plus is a good example; it is extremely thick and rather opaque, much like smooth toothpaste. As well as being an excellent adhesive for plywood and metal, it's also useful for making fillets.

Though it isn't actually an adhesive, I'll include finishing resin in our discussion; it's a thin epoxy compound and, as its name implies, it's used to finish a model's surface. I like Pacer Z-Poxy very much; I use it to attach fiberglass cloth to my models and to seal and fuelproof firewalls and fuel-tank compartments.

Like all epoxies, finishing resin is a two-part compound and is very easy to apply with a brush. To save weight, speed application and reduce the amount of sanding you have to do, thin the mixed resin with an equal amount of isopropyl alcohol. Some modelers simply pour a

Finishing resin is a thin epoxy that's used, as its name implies, to finish model surfaces; it's also excellent for fuelproofing firewalls.

little finishing resin onto a glass-covered wing or a fuselage and then squeegee it around with a playing card or a thin sheet of balsa. Once it has cured, Z-Poxy is very easy to sand and produces a smooth finish.

Well, that's about it for this month. I hope I've answered some of your questions. With a little experience, you'll develop your own gluing preferences. Learn what works for you, then stick with it! Enjoy!

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

Multi-Engine Wiring, Part 2

Last month, we looked at parallel and series wiring of twin engine airplanes and discussed why we might choose one method over the other. This month, I'll build on that and look at ways to use those methods with each other to solve some interesting challenges. Using this knowledge, I'll show you how to make some decisions on wiring planes with perhaps four or more motors and still use normally available equipment. I know there are some electrical-engineer types out there who build their own controllers for dealing with some of these problems, but most of us want to use what's on our shelf, and this will allow us to do just that, so let's take a look at some scenarios.

Dave Baron's 20-pound B-17 flies well with four geared AstroFlight 05s.

Remember last month we talked about doing a twin-engine aircraft using Speed 400 motors and decided we may want to use a parallel setup, since the combined current might only be 20 amps at full throttle. With a four-engine plane with Speed 400s, the combined current in a parallel circuit would still only be about 40 amps (remember we plan for about 10 amps per motor for Speed 400s), and that falls well within our current limits for many speed controllers. But there is another way to do that yet get lower current demands on the controller and battery pack—a combination of series and parallel circuits in one system (Figure 1).

"Where's the advantage?" you ask. If you were to do this in one series circuit, you would have 28 cells and draw only 10 amps, but it would take a lot of room for the batteries, and they would have to be very small cells or the plane would be quite heavy. To do it in parallel the circuit would have only 7 cells, but the current would be 40 amps, and maybe we don't want that much current. Using a combination of parallel and series circuits takes advantage of the best of both systems. By wiring the motors as pairs in series and then wiring the two motor pairs in a parallel connection with the controller and motor pack you provide half the cell count of a completely series system and yet have only half the current of a completely parallel system. It's a compromise to get some of the benefits of each system. This may not seem necessary with smaller motors like the Speed 400, but for larger motors, it's a very workable solution to a problem.

Imagine a giant-scale plane with four Astro 25Gs on board requiring 16 cells each. To use a series system would require 64 cells, and since each motor will draw around 25 amps, we have to use the larger cells like the Sanyo 2000RCs; that's a ton of cells (OK; maybe only about 8 pounds, but that's a lot of battery weight). If we do to it as a parallel circuit to reduce the weight, we use only 16 cells, but we're drawing about 100 amps (four motors at 25 amps each), and that just isn't a workable solution. In a series/parallel circuit, we'd have 32 cells and a 50A current draw, which is workable with normally available equipment. Those of us who are sport flyers still tend to think of 50 amps as a lot of current while those of us who are into competition might see it as low compared to the current required by our F5B planes, but let's remember that we'll probably only be seeing this full-throttle current level on takeoff and will spend the rest of our flight at lower throttle settings.

You can make these four-motor setups more reliable by wiring the two outboard motors together in one series and the inboard motors in the other and using a fuse to isolate them from the whole circuit in case of a malfunction in one of the motors. I must admit I've never experienced a motor failure in flight (thrown brush holder, open comm, etc.), but I have seen a couple of single-motor planes quit due to one or more of these malfunctions. By wiring them this way, you'll still have an engine on each side of the plane to help you nurse it back home and avoid any asymmetrical-thrust problems at the same time.

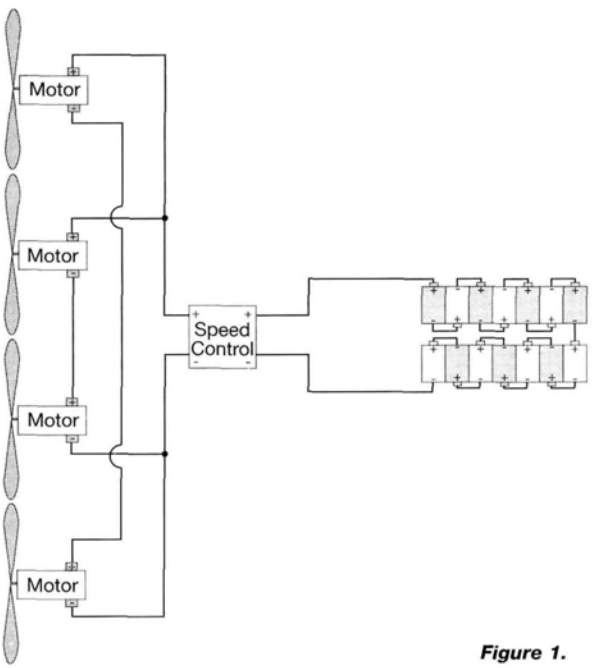


Figure 1.

OK; what if we decide that the 50 amps is still too much, and the weight of 64 cells really isn't a problem in our super, giant-scale transport plane? First, we bump into the fact there isn't a controller that will handle 64 cells because of the liability issues involved with the manufacturers. This is a serious amount of voltage, but there is a way around it, and that's what we'll look at now.

Obviously, this plane is a very large project and requires some "alternate thinking." Why can't we just wire two motors on one circuit and the other two on an independent circuit? We can. By doing this

Woody Blanchard's Speed 400-powered 81-inch Spruce Goose weighs only 6 pounds.

as a dual series system (see Figure 2) we avoid all the problems of the high voltage or high current found in our last method when doing high-cell-count motor systems. Each circuit consists of two motors (25s in our example), 32 cells and a speed control. With these two independent series circuits, all we have to do is use a "Y" cord to connect the two speed controls to the receiver.

This might also be a good time to address some questions I've gotten regarding the use of brushless motors in multi-engine projects. The main question is, "Can it be done?" and the answer to that is "Yes, but ...." The brushless motors that most of us use are Hall sensor motors, each requiring its own dedicated controller, so there's no way to wire two motors to one controller. You can do a multi-engine project by wiring two complete systems as dual series circuits and tying both controllers to the receiver with a "Y" cord. It's a shame, but I'm afraid that's the answer for the time being, although there is some hope on the horizon. Sensor-less controllers are now being manufactured; they supposedly allow two brushless motors to be driven through one controller, but I've yet to see it done by anyone. Rumor has it that there are such systems operating in Europe, so it's only a matter of time before we see them. For further information on the Konitronics sensor-less controller, I suggest you contact Sal at Northeast Sailplane Products*, which is its U.S. distributor.

Back in December, we talked about chargers and why we might want to buy one that charges more than 7 or 10 cells, and this multi-engine discussion makes our discussion even more pertinent. Once you get into some of the larger planes, you may only be using 05s, but in series, you end up with a 28-cell pack and suddenly, you have a charging problem if you have a smaller charger. While you can make large packs that are made of four 7-cell packs and charge them independently, you end up with the problem of trying to keep four separate packs balanced to make one good 28-cell pack. I don't recommend this under most circumstances. Yes, it's being done by some, and they're getting away with it, but over time, it's not as good as a dedicated large pack of cells charged as a unit.

One thing we've skipped over is how to decide what size plane and what size motors we should pick for a particular, large-scale multi-engine project. A subject like that is a whole article in itself and has been done by Keith Shaw (see December 1991 *Model Airplane News*), but if there is enough interest and you can't get hold of Keith's article, we can review some of that information in a future column.

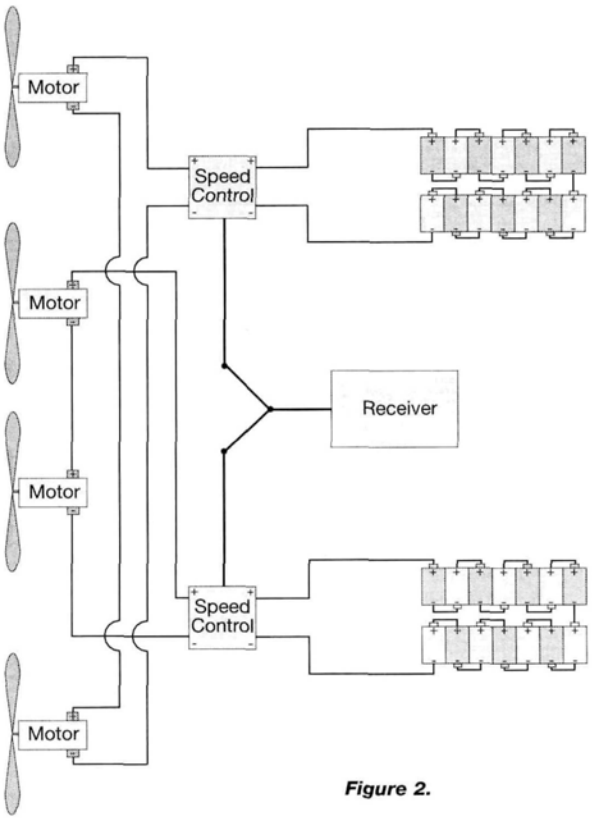


Figure 2.

I also used an example of four Astro 25s in our dual series example, and that would certainly fly a very large aircraft, but very large multi-engine aircraft fly on much smaller motors. Dave Baron's giant-scale B-17 (see photo) makes an annual appearance at KRC and wows the crowd each and every time. It weighs almost 20 pounds and spans in excess of 100 inches. It's powered by four Astro 05Gs and 32 cells. Keith Mey's B-17F spans 78 inches and is also powered by four 05s but this time, they are direct drive and spin 7x6 props on 28 cells; the plane weighs in at 11½ pounds.

One of the hybrid wiring methods was employed by Woody Blanchard when he wired the eight Rocket 400 motors in his Spruce Goose. Woody did a good job of keeping this 81-inch plane light (a mere 6 pounds) by using a series/parallel system on 12 cells and a total current of only 32 amps. Having seen this one fly, I can say it takes off with authority and flies beautifully.

So there you have it: several ways to configure multi-engine power systems. For dream planning, I heartily recommend one of the setup simulation programs like ElectriCalc* or MotoCalc*; both allow you to model the systems in parallel or series, but not a combination. That's not a problem because with the information provided for the other two methods, you can interpolate to approximate the others. I find ElectriCalc a bit more intuitive to use, and it's the one I generally grab for quick information, but both are excellent programs. For further information about wiring multi-engine setups, I also suggest you call SR Batteries* and request a copy of "SR Electric Flight Techniques, Vol. E-16." Larry Sribnick describes multi-engine systems very well and includes wiring diagrams that show where to wire in charging jacks and fuses. If you haven't seen "Electric Flight Techniques," you're missing a good source of information.

My photo collection is getting thin, so please send photos of your electric planes to me at 1016 Camberley Dr., Apex, NC 27502-8107 or greggimlick@mindspring.com so I can share them with everyone and help folks be successful by seeing what works. Be sure to include all the information you can think of about your setup, and if you have video of a dream project flying, all the better.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.* ✦

PRODUCT NEWS

Latest product releases

INFORM YOUR CUSTOMERS! **Model Airplane News is interested in showing our readers your new products—here in Product News. If you'd like to see your *products here, send us a clear photo and a press release that provides information* about your product! We'll publish as many as space permits.**

Send your announcements to: Product News, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

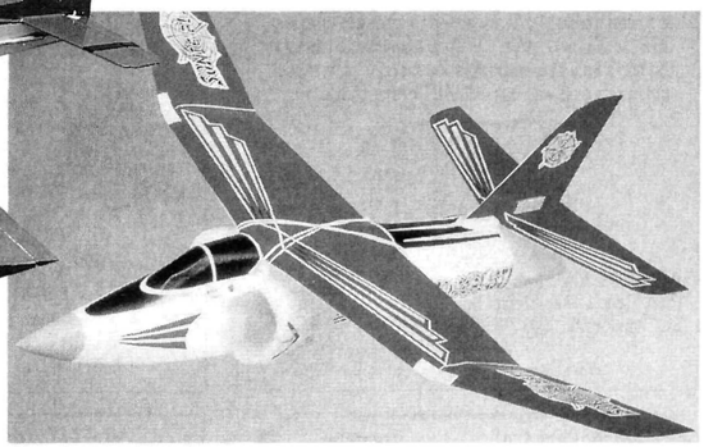
HOUSE OF BALSA INC.

Profile Series

These kits feature a solid laser-cut fuselage and tail feathers, all balsa and ply construction, full-size rolled plans, Du-Bro hardware, photo-illustrated instructions and adhesive Mylar decals. Both the P-51D Mustang and the Extra 300L have these specifications: wingspan—36 inches; length—29 inches; weight—22 to 26 ounces; radio required—2- to 4-channel with micro system; engine required—.061 to .12 2-stroke.

Part nos.—K-31 (P-51D), K-32 (Extra); **price**—$54.95 each.

House of Balsa Inc., 10101 Yucca Rd., Adelanto, CA 92301; (760) 246-6462; fax (760) 246-8769; email: hobandzap@aol.com; website: www.houseofbalsa.com.



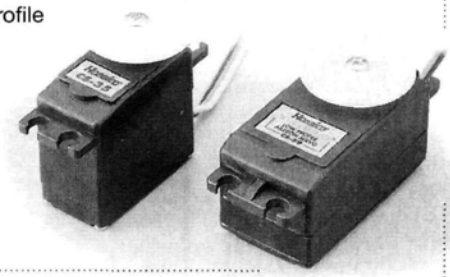
HOBBICO

Smaller Servos

The new CS-35 servo was designed for use in electric sailplanes and small airplanes. Its top ball-bearing construction delivers smooth, precise input control and features the highest torque in its class. The new CS-59 servo was designed for use in compact wings and fuselages, and it also features top ball-bearing construction. The CS-59 is watertight and features a combination metal/resin gear train.

Prices—$34.95 (high-power mini servo), $49.99 (low-profile aileron servo).

Hobbico; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



GREAT PLANES

Sonic Blast

This electric, free-flight ducted fan comes almost completely assembled and can be ready to fly five minutes out of the box. Charge the onboard battery, turn on the motor and toss it. The model is built out of sturdy foam and has an impact-resistant rubber nose and protective landing skids. The Sonic Blast comes with a charger, an electric-fan motor and a 100mAh Ni-Cd battery installed; it requires only six D-cell batteries for the charger. Specifications: wingspan—24.4 inches; length—21.7 inches; weight—4.76 ounces.

Part no.—GPMA4000; **price**—$39.99.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008; website: www.greatplanes.com.

PAT'S CUSTOM MODELS

P-47 Thunderbolt Rolled Plans

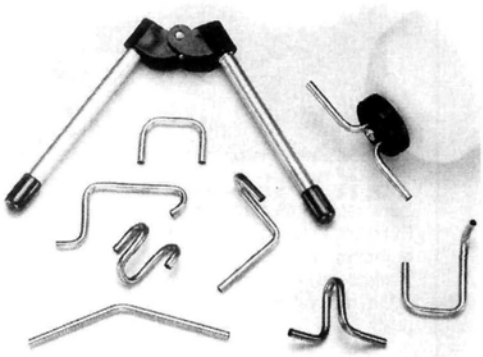
With a 49-inch wingspan, this 53- to 58-ounce model was designed to use Kyosho's Magnetic Mayhem 05 motor and Olympus 2.3:1 belt drive on 10, 1000 or 1700mAh cells. Construction features foam wings and a built-up balsa-and-ply fuselage. It has stable flying characteristics and is very aerobatic on three channels (elevator, aileron and throttle). For a complete catalog, send an SASE to Pat's Custom Models.

Price—$19.95 (plus $5 S&H).

Pat's Custom Models, 10313 Snowheights Blvd. NE, Albuquerque, NM 87112-3054; (505) 296-4511; website: www.thuntek.net/pcmodels.

DU-BRO PRODUCTS INC.

Tube Bender



This tool is designed to be used with ⅛-inch-diameter aluminum and annealed brass tube, and it won't distort the tube wall. It's perfect for making fuel-tube lines and air lines for retracts.

Part no.—785; **price**—$9.95.

Du-Bro Products Inc., 480 Bonner Rd., P.O. Box 815, Wauconda, IL 60084; (800) 848-9411; (847) 526-2136; fax (847) 526-1604.

PRODUCT **NEWS**

HOBBY HANGAR

One Design .40

This Rich Uravich design is a 1/5-scale model ideally suited to miniMAC competition. The kit features full-size plans, formed aluminum landing gear, and vacuum-formed wheel pants, cowl and clear canopy. The balsa, ply and hardwood parts are all laser or machine cut. Specifications: wingspan—47.2 inches; length—44 inches; wing area—455 square inches; weight—4.5 to 5.5 pounds; engine recommended—.40 to .50 2-stroke or .52 to .70 4-stroke.

Part no.—HGR200; **price**—$109.99.

Hobby Hangar, 1862 Petersburg Rd., Hebron, KY 41048; (606) 334-4331; website: www.hobbyhangar.com.

THE TESTOR CORP.

Corgi Aviation Die-Cast Scale Models

Each model is meticulously researched and authenticated with manufacturers, airline operators and air forces using original plans and archive material to bring you the finest collectible scale models from one of the most famous names in die-cast models.

The Testor Corp., 620 Buckbee St., Rockford, IL 61104; (800) 962-6654 or (815) 962-6654; fax (815) 962-7401; website: www.testors.com.

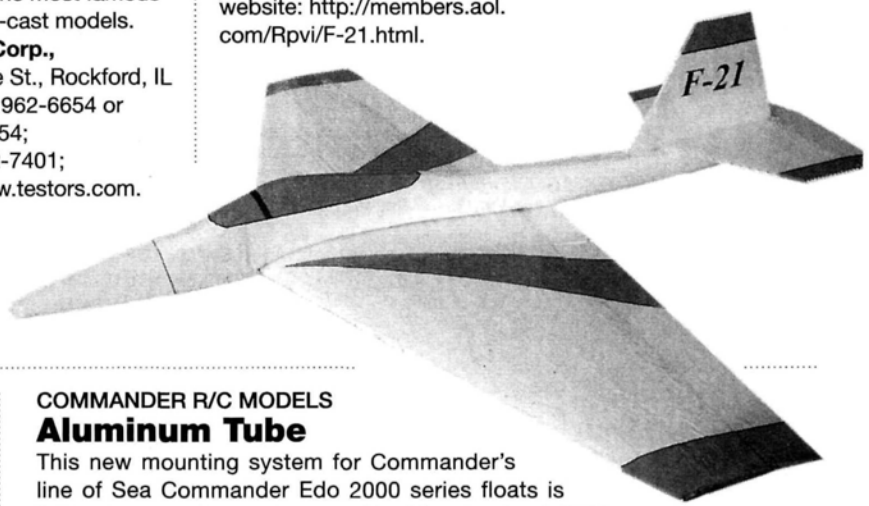
RPV INDUSTRIES

F-21 Predator

This innovative new design has a faster roll rate and greater top speed than other EPP combat planes. It features a highly tapered wing for a quick roll rate, Coroplast tail surfaces and a light, strong, advanced composite wing-spar rod. All hardware is included. Specifications: wingspan—48 inches; length—36 inches; flying weight—29 ounces; wing loading—9 ounces per square foot.

Price—$59 (plus $5 S&H).

RPV Industries, 3428 Middlefield Rd., Palo Alto, CA 94306; (650) 493-5502; email: rpvi@aol.com; website: http://members.aol.com/Rpvi/F-21.html.



METEOR PUBLISHING

Stick and Tissue Modeler's Album

This new, 80-page book is the first in a forthcoming series by aircraft design engineer and longtime modeler Tim Bucher. It includes removable full-size plans, detailed construction articles and more than 100 photographs and illustrations for 10 easy-to-build models. Other chapters include general building and covering guidelines; installing a dethermalizer system; rise-off-water (ROW) flying; propellers, rubber motors and flight trimming; and an appendix of suppliers and recommended reading.

Price—$14.95 (plus $3 S&H).

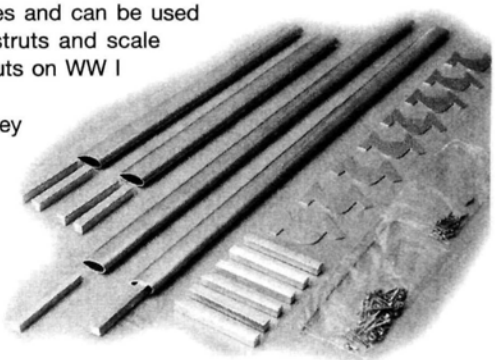
Meteor Publishing, 42263 50th St. W., Ste. 703, Quartz Hill, CA 93536; (805) 943-2435; email tsbucher@gateway.net; website: http://members.xoom.com/meteorpub/.

COMMANDER R/C MODELS

Aluminum Tube

This new mounting system for Commander's line of Sea Commander Edo 2000 series floats is light, strong and easy to assemble. The structural (6061 T6, 0.035-inch wall), seamless aluminum tube for spreader bars and N-struts comes with scale float-mounting brackets, end fittings and stainless-steel attachment hardware. The tube is available in four sizes and can be used with other floats and for wing struts and scale undercarriage and interplane struts on WW I models.

Commander R/C Models, Langley Airport, #7 5333 216th St., Langley, BC, Canada V2Y 2N3; toll-free U.S. and Canada (877) 514-3027; (604) 514-3027; fax (604) 514-3028; website: www.bcbiz.com/members/commander.



MODEL AIRPLANE NEWS CLASSIFIEDS

RATES: non-commercial—25 cents per word (no commercial ads of any kind accepted at this rate); commercial—50 cents per word (*applies to retailers, manufacturers, etc.*); *count all initials, numbers,* name and address, city, state, zip code and phone number. All ads must be paid for in advance. To run your ad for more than one month, multiply your payment by the number of months you want it to run. Deadline: the 10th day of the month, 3 months in advance, e.g., *January 10 for the April issue.* We don't furnish box numbers, and it isn't our policy to send tear sheets. Please make all checks payable to: AIR AGE, INC. SEND AD AND PAYMENT TO: CLASSIFIED ADS, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA, or call (203) 431-9000.

BUSINESS

MAKE YOUR OWN ROCKET MOTORS!!! Homemade solid and composite fuels, power R/C gliders, model rockets, etc. Smoke tracers for R/C planes and choppers, electric igniters, cannon fuse "chemicals," lab acids. Glassware, "how to" books, videos, rocket motor kits; huge catalog $2. Pyrotek, P.O. Box 300, Sweet Valley, PA 18656; (717) 256-3087. [7/99]

FLY FOR REAL IN THE SAFEST, EASIEST-TO-FLY AIRCRAFT IN THE WORLD. Learn to fly in one day, build or buy used, no licenses required. Powered Parachute Newsletter. Lots of good information on powered parachutes, featuring the largest collection of used powered parachutes for sale in the world! $20 annual subscription, 4 issues. Visa or Mastercard. Portland Powerchutes Inc., 28621 S.E. Woods Rd., Eagle Creek, OR 97022; (800) 457-4310. [3/99]

REPLICA SWISS WATCHES—18KT goldplated! *Lowest prices! Two-year warranty!* Waterproof divers, chronographs, others! Phone (770) 682-0609; fax (770) 682-1710.

PLANS ENLARGING SOFTWARE—PLANS ENLARGING: old magazines, scanning, plotting. Free information. Concept, Box 669A, Poway, CA 92074; (619) 486-2464. [3/99]

LARGE-SCALE SAILPLANES AND TOW-PLANES—new and used. Call (212) 879-1634; Sailplanes Unlimited, 63 East 82nd St., New York, NY 10028; www.sailplanes.com. [3/99]

PLANS—R/C sailplanes, scale, sport and electric. Old-timer nostalgia and FF scale and sport-powered, rubber and towline. All models illustrated. Catalog $2. Cirrus Aviation, P.O. Box 7093, Depot 4, Victoria, BC V9B 4Z2 Canada. [5/99]

SEMI-RETIREMENT SALE - BRIDI AIRCRAFT. Have many kits in stock of favorite designs. Good prices. Send SASE for free brochure of remaining aircraft in stock to 23625 S. Pineforest, Harbor City, CA 90710; (310) 549-8264 or (310) 326-5013; fax (310) 549-8268. [4/99]

OBECHI VENEER, premium grade sheets, 1/32"x12"x132" long—$8.50 U.S. +S&H, more sizes available. We manufacture 15 glider kits ranging from hand-launch to 5-meter scale. Hitec dealer. 10-meter rolls of Ultracote. Send $0.60 in postage for our photo-illustrated catalog to Dream Catcher Hobby Inc., P.O. Box 77, Bristol, IN 46705 or see our Web page at http://www.dchobby.com. To order, call (219) 523-1938; we accept Visa/MC. [7/99]

GIANT-SCALE PLANS, $19.95. Photo/info, email rcpaeroplans@freewwweb.com. [4/99]

www.coptercorner.com: a full-service R/C helicopter site since 1978. Email: helifly@best.com. [12/99]

A FREE PLAN WITH EACH ISSUE OF FLYING SCALE MODELS MAGAZINE! Providing coverage for all categories of flying scale models, each issue is filled with information, techniques, insights and fun, as well as a FREE pull-out plan. For one-year subscription (6 issues), send $37 check, payable: Wise Owl Publications, 4314 W. 238th St., Ste. B, Torrance, CA 90505-4509; (310) 375-6528. [2/99]

SCALE PLANS. Northrop N9M-B Flying Wing, Golden Age Air Racers, U.S. WW II experimental fighters, MORE. Photos, plans, books. Many unusual. Catalog $4: RIS, 205 Maryland Ave., Paterson, NJ 07503; email Hdente@aol.com. [4/99]

ALUMINUM CAN PLANS. Airplanes, Race Cars, Ships. LSASE for list. Tesscar, Box 333A, Scappoose, OR 97056, or http://members.aol.com/tesscar. [5/99]

THE FINEST IN R/C SOARING VIDEOS! The best-seller "ENDLESS LIFT," and our NEW "ENDLESS LIFT 2-Ultimate Soaring." Information and previews on our website: wwww.radiocarbonart.com. Tapes $24.95 each, both for $39.95 (plus $3 shipping), MBG, Visa/MasterCard. Radio Carbon Art, P.O. Box 2311, Dept. M, Corvallis, OR, 97339-2311; (541) 752-9661. [4/99]

R/C SOARING DIGEST: monthly journal for R/C soaring enthusiasts focusing on technical, construction techniques and glider design since 1984. Sample copy: $2.50. One-year subscription: $30—check payable to RCSD, P.O. Box 2108, Wylie, TX 75098, (972) 442-3910. [6/99]

GIANT-SCALE PLANS BY HOSTETLER: catalog $2 (plus SASE) to Hosteteler's Plans, 1041 Heatherwood Ln., Orrville, OH 44667; website www.aero-sports.com/whplans; (330) 682-8896. Our plans are now available in any size and scale. [12/99]

MINIATURE PLUNGE ROUTER BASE AND NEW TEMPLATE GUIDE BASE. Fits Dremel, Ryobi, Foredom. "Am I impressed? You bet!"—review, Model Airplane News, November 1998, p. 78. Bishop Cochran (503) 231-5694; http://www.bishopcochran.com. [3/99]

FOX OWNERS! For Fox R/C engines old or new, our comprehensive operating manual covers carburetors, troubleshooting, modifications and solutions for common problems. $10 (U.S.) PPD to Flite Line Solutions, Box 31781, Pitt Meadows, B.C., Canada, V3Y 2H1. We also have parts! For more info, email flsol@mailexcite.com; website: www3.bc.sympatico.ca/fliteline. [3/99]

HIGH-QUALITY LASER-CUT PROFILE AND SCALE KITS. For more information, send SASE to Hoemcraft Aviation, 1204 S. 4th, *Independence, OR 97351; website http://members.aol.com/hoemcraft/aviation.html;* email: hoemcraft@aol.com. [5/99]

STRING TRIMMER—excellent 1/4-scale gas engines. Custom conversions. Homelite, Ryobi, Weedeater, McCulloch, Honda, etc., kits and accessories. Conversion design package, $5. Visa. Carr Precision, 6040 N. Cutter Circle #303, Portland, OR 97217; (503) 735-9980; http://home.att.net/~carrprecision. [3/99]

HOBBYIST

WANTED: old, unbuilt, plastic model kits from '50s and '60s. Send list, price to Models, Box 863, Wyandette, MI 48192. [3/99]

MAGAZINE BACK ISSUES—American Modeler, American Aircraft Modeler, Aeromodeller, Model Airplane News, Model Aircraft, RCM and more; 1930s to 1990s. For list, send SASE to Carolyn Gierke, 1276 Ransom Rd., Lancaster, NY 14086. [3/99]

HIGH PERFORMANCE AIRBOAT PLANS: unlike any other airboat on the market. Tested and proven design. Clocked at 35mph+. Slides around turns just like the full-size airboats. Have fun all year round; water, snow, ice. 4x4 for the water. You won't be disappointed. Balsa/plywood construction. Includes instructions, .40-size aircraft engine and 2-channel radio. Plans $15. Krisaire, Box 195, Yardley, PA 19067. [3/99]

MODEL WARPLANES: 10,000 plans, kits; $18. John Fredriksen, 461 Loring, Salem, MA 01970; http://www.rconline.com/1812. [4/99]

WANTED: plans, kit, or magazine by Phil Kraft for Quick Fly 3, mid-1970s. Call (732) 681-1643. [4/99]

ILLNESS SALE: kits, planes, plans, engines, servos, power packs, chargers, radios and much more. Call Leon at (302) 629-4858. [5/99]

WANTED: plans, copy of plans, source for *plans, or any info about the Seasquire* GT flying boat by George Wilson. Late '70s magazine construction article. Scott WHale, 610 Washburn St., Missoula, MT 59801; (406) 542-3379. [3/99]

SALE—LEAVING HOBBY: Skylane (Midwest)—WS 82 in., $475; Stinger 120—WS 82 in., $500; DHC Chipmunk (Ohio)—WS *82 in., $500;* SE5-A 1/4 *scale (Proctor), $550;* Mooney Porsche w/retracts—WS 83 in., $500. All planes with servos and batt. Futaba FP8UAP 6-meter, new—$299 to plane buyer. Priced for fast sale. Cannot ship. Stan Shur, Boca Raton, FL; (651) 750-2172. Call between 1 and 4 p.m. [3/99]

EVENTS

ROANOKE VALLEY RADIO CONTROL 21st *R/C Model Aircraft Swap Shop and Auction* - March 13, 1999; Roanoke Civic Center Exhibit Hall, Roanoke, VA. Over 100 tables - Huge Static Contest Cash Awards - Concessions - Door Prizes. AMA District IV meeting - 10 am to 3 pm. Admission $4; 12 *and under FREE. Tables $10 each. First* come, first served. Hobby shops on site. For event information contact: Marshall McClung (540) 989-9494. More info on our website: www.roanoke.infi.net/~mstubbs. Static info: Mike Knapp (540) 297-8786. [3/99]

APRIL 18 ELK GROVE VILLAGE, IL: Chicagoland Radio Control Modelers 18th annual acution and swap meet. Al Hattendorf Center, 225 E. Elk Grove Blvd.—10 a.m. to 2 p.m.; general admission $3; vendors $12 (first table) *includes one admission. Additional* tables $10 each. Set up: 8:30-10:00; doors open to public 10 a.m.; auction at noon. Advance reservations accepted. Dave Crown, 9386 Landing Sq. # 507, Des Plaines, IL 60016-5270; (847) 824-6392. [5/99]

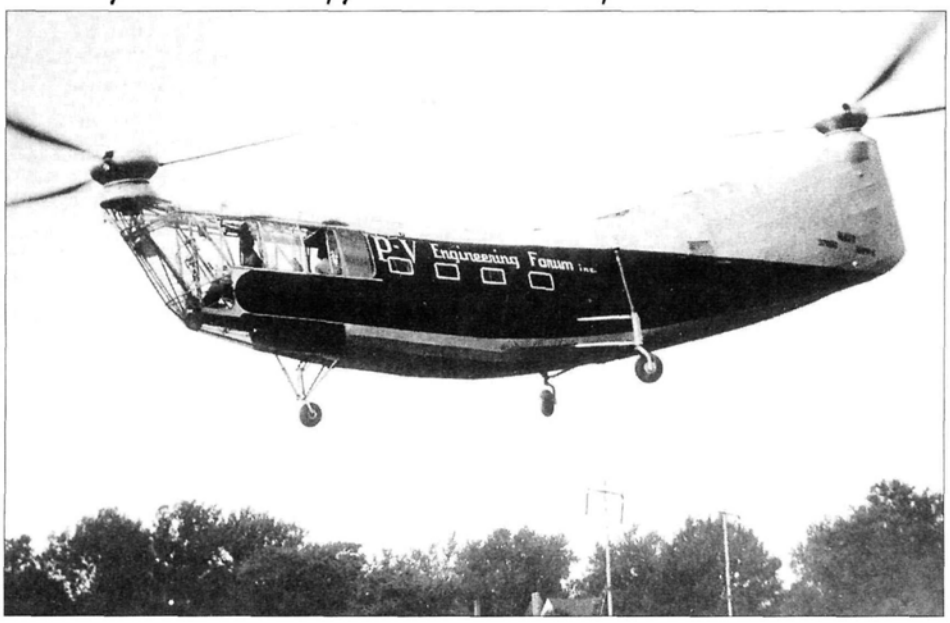
4 TH ANNUAL R/C MODEL SWAP MEET, Grants Pass, Oregon. Josephine County Fairgrounds, Hwy. 199, Exit 55 off Interstate I-5. Admission $1.00; free parking; lunch on site; free coffee. Sat. April 10, 1999—8:30 a.m. till 2:00 p.m. 100 tables for sale at $10 each. Setup time: 7:30 a.m. Call (541) 476-3162 for flyer; fax (541) 474-5828. [4/99]

"T.O.C. OF MARYLAND." Fly-in and competition—May 21, 22, 23. Fun-packed weekend filled with fantastic flying and great food! Competitors will fly known and unknown programs with emphasis on freestyle acrobatics. $$ prizes. Raffles. Free flea-market area. Vendors welcome. Call Art Vail (410) 247-4281, or email artvail@erols.com. [6/99]

NAME THAT PLANE

Can you identify this aircraft?

Send your answer to *Model Airplane News*, **Name that Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606 USA.



The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. mail) and will receive a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free, one-year extension of his subscription.

Congratulations to Frank J. Gasperich Jr. for correctly identifying the December 1998 mystery plane as the North American A-1 Savage attack bomber. Designed to carry an atomic bomb, it was capable of taking off—with or without catapult aid—from an aircraft carrier deck. Its unique piston/jet power arrangement included two conventional Pratt & Whitney engines under its wings and a single Allison J-33 turbojet mounted in the aft section of its fuselage. The piston engines provided 2,300hp each, and the turbojet provided an additional 4,000 pounds of thrust. The 71-foot-span, 17-ton aircraft had a maximum speed of approximately 425mph.

Index of Manufacturers

Ace Hobby Distributors
116 W. 19th St.,
P.O. Box 472,
Higginsville, MO 64037;
(816) 584-7121;
fax (816) 584-7776.

Airtronics
1185 Stanford Court,
Anaheim, CA 92805;
(714) 978-1895;
fax (714) 978-1540.

Anchor Seal
16 Riverside Ave.,
Danvers, MA 01923;
(978) 774-5217.

AstroFlight Inc.
13311 Beach Ave.,
Marina del Rey, CA 90292;
(310) 821-6242;
fax (310) 822-6637;
website:
www.astroflight.com.

Balsarite
distributed by Coverite
(address below).

Bishop Cochran
4326 SE Woodstock Blvd.
#498, Portland, OR 97206;
(503) 231-5964,
fax (503) 777-0955;
website:
www.BishopCochran.com

BVM
170 State Rd. 419;
Winter Springs, FL 32708;
(407) 327-6333;
fax (407) 327-5020;
website: bvmjets.com.

Capable Computing Inc.
8150 Concession 5,
R.R. #3, Moorefield,
Ontario, CANADA N0G 2K0;
(519) 638-5470.

CGM (Carl Goldberg Models)
4734 W. Chicago Ave.,
Chicago, IL 60651;
(312) 626-9550;
fax (312) 626-9566.

C.B. Tatone Inc.
21658 Cloud Way,
Hayward, CA 94545;
(510) 783-4868;
fax (510) 783-3283.

Coverite
distributed by Great Planes
(address below).

CR Aircraft Models
205 Camille Way, Vista, CA
92083; (760) 630-8775.

Dave's Aircraft Works
34455 Camino El Molino,
Capistrano Beach, CA
92624; (714) 248-2773;
website:
davesaircraftworks.com.

Dave Brown Products
4560 Layhigh Rd.,
Hamilton, OH 45013;
(949) 738-1576;
fax (513) 738-0152.

Du-Bro Products,
P.O. Box 815,
Wauconda, IL 60084;
(800) 848-9411;
website: www.dubro.com.

Durable Aircraft Models
59 Matisse Circle,
Aliso Viejo, CA 92656;
phone/fax (714) 362-9222;
website: www.globalpac.
com/damkits.

ElectriCalc
distributed by SLK
Electronics
(address below).

Fiberglass Designs
60 A. N. Miami,
W. Wilton, OH 45383
(800) 548-3383;
fax (513) 698-6486.

Futaba Corp. of America
P.O. Box 19767,
Irvine, CA 92723-9767;
(714) 455-9888;
fax (714) 455-9899.

Glasco Aircraft
72 South 500 West
Bountiful, UT 84010

Global Hobby Distributors
18480 Bandilier Circle,
Fountain Valley, CA
92728-8610;
(714) 963-0133;
fax (714) 962-6452.

Graupner
distributed by Hobby
Lobby Intl.
(address below).

Great Planes Model Distributors
2904 Research Rd.,
P.O. Box 9021,
Champaign, IL 61826-9021;
(800) 682-8948;
fax (217) 398-0008;
website: www.
greatplanes.com.

Hangar 9
distributed by Horizon
Hobby(address below)

Harry Higley & Sons Inc.
P.O. Box 532,
Glenwood, IL 60425.

Hobbico/Great Planes
(address above)

Hobby Lobby Intl.
5614 Franklin Pike Cir.,
Brentwood, TN 37027;
(615) 373-1444;
fax (615) 377-6948;
website:
www.hobby-lobby.com.

Hobby Poxy
36 Pine St.,
Rockaway, NJ 07866;
(973) 625-3100;
fax (973) 625-8303.

Horizon Hobby Distributors
4105 Fieldstone Rd.,
Champaign, IL 61821;
(217) 355-9511;
website:
www.horizonhobby.com.

IMP (Innovative Model Products)
P.O. Box 333,
Remsen, NY 13438.

JK Aerotech
10800 S.E. Orient Dr.,
Boring, OR 97009;
(503) 663-4081;
website: www.teleport.com
/~jdickman/jkaerotech
/jka.shtml.

J&Z Products
25029 S. Vermont Ave.,
Harbor City, CA 90710;
(310) 539-2313

J'Tec
164 School St.,
Daly City, CA 94014;
(650) 756-3400.

K&B Mfg. Inc.
2100 College Dr.,
Lake Havasu City, AZ
86403; (520) 453-3030;
fax (520) 453-3559.

Kyosho/Great Planes Model Distributors
P.O. Box 9021,
Champaign, IL
61826-9021;
(217) 398-6300;
fax (217) 398-1104;
website: www.
hobbies.net/kyosho.

LDM Industries Inc.
P.O. Box 292396,
Tampa, FL 33687-2396;
(813) 991-4277;
fax (813) 991-4810.

Master Airscrew
distributed by
Windsor Propeller Co.,
3219 Monier Cir.,
Rancho Cordova, CA
95742; (916) 631-8385;
fax (916) 631-8386.

Morgan Fuels
a division of Morgan Inc.,
P.O. Box 1201,
Enterprise, AL 36331;
(205) 347-3525;
fax (205) 393-4852.

Morris Hobbies
4200A Leghorn Dr.,
Louisville, KY 40218;
800-826-6054;
(502) 451-0901;
fax (502) 451-6602.

MotoCalc
distributed by Capable
Computing Inc.
(address above).

Northeast Sailplane Products
16 Kirby Ln.,
Williston, VT 05495;
(802) 658-9482;
website: www.nesail.com.

O.S.
distributed by Great Planes
(address above);
website:
www.osengines.com.

Pacer Technology
9420 Santa Anita Ave.,
Rancho Cucamonga, CA
91730; (909) 987-0550;
(800) 538-3091.

RJL Industries USA
P. O. Box 5,
Sierra Madre, CA 91025;
(626) 359-0016;
fax (626) 301-0298.

Ryan Aircraft
6941 Rob Vern Dr.,
Cincinnati, OH 45239;
(513) 729-3323.

See-Temp
345 Lake Breeze Dr.,
Chilton, WI 53014.

Sig Mfg. Co. Inc.
P.O. Box 520,
Montezuma, IA 50171;
(800) 524-7805;
(515) 623-3922;
fax (515) 623-3922;
website: www.sigmfg.com.

SLK Electronics
2906 Charolais Dr.,
Greensboro, NC 27406;
website:www.
SLKelectronics.com/
ecalc/index.htm.

Slope Scale
12935 Lasselle St.,
Moreno Valley, CA 92553;
(909) 924-8409;
website: ourworld.
compuserve.com/
homepages/slopescale.

SR Batteries Inc.
Box 287,
Bellport, NY 11713;
(516) 286-0079;
fax (516) 286-0901.

Sullivan Products
P.O. Box 5166,
Baltimore, MD 21224;
(410) 732-3500;
fax (410) 327-7443.

Thunder Tiger
distributed by
Ace Hobby Distributors
(address above).

Titebond
distributed by Franklin
Glue, Columbus, OH.

Top Flite
distributed by Great Planes
(address above).

Tower Hobbies
P.O. Box 9078,
Champaign, IL
61826-9078;
(800) 637-4989/6050;
fax (800) 637-7303;
website:
www.towerhobbies.com.

Zap Glue
9420 Santa Anita Ave.,
Rancho Cucamonga, CA
91730.

MODEL AIRPLANE NEWS (ISSN 0026-7295, USPS 533-470) is published monthly by Air Age Inc., 100 East Ridge, Ridgefield, CT 06877-4606 USA.

Periodical postage *permit paid at Ridgefield, CT, and additional mailing offices.*

SUBSCRIPTIONS. U.S. and Canada, call (800) 827-0323; elsewhere, call (815) 734-1116. Or set your Web browser to www.airage.com/subscribe.html. **U.S.**: $34.95 (one year), $55.95 (two years). **Canada**: $49.95 (one year), $87.95 (two years), inc. GST, reg. no. 13075 4872 RT. **Elsewhere**: $47.95 (one year), $81.95 (two years). Prepayment required; Visa, MC and AmEx accepted.

EDITORIAL. Send correspondence to Editors, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. EMAIL: man@airage.com. We welcome all editorial submissions, but assume no responsibility for loss/damage of unsolicited material. To authors, photographers and people featured in this magazine: all materials published in *Model Airplane News* become the exclusive property of Air Age Inc., unless prior arrangement is made in writing with the Publisher.

ADVERTISING. Send advertising materials to Advertising Dept., *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; phone (203) 431-9000; fax (203) 431-3000.

CHANGE OF ADDRESS. To make sure you don't miss any issues, send your new address to *Model Airplane News*, P.O. Box 428, Mount Morris, IL 61054 USA, six weeks before you move. Please include the address label from a recent issue, or print the information exactly as shown on the label. The Post Office will not forward copies unless you provide extra postage.

POSTMASTER. Please send Form 3579 to *Model Airplane News*, P.O. Box 428, Mount Morris, IL 61054 USA.

Advertisers

BY DON EDBERG

Unmanned aircraft sets world record

WHICH AIRCRAFT has a 76mph cruise speed, a 2-gallon (7.5 liters) gas tank and a range of over 3,270 kilometers (2,032 miles!)? It's the newest version of the Aerosonde, a 13.1-kilogram (28.9 pounds) research aircraft that recently became the first pilotless plane to cross the Atlantic.

Aerosonde was developed by the Insitu Group in Washington state and the Environmental Systems & Services in Melbourne, Australia, and the Australian Bureau of Meteorology. It was designed to fly long distances over the ocean, not to break records but for another purpose: to monitor winds, pressure, temperature and humidity to improve the accuracy of weather forecasting. A great deal of this information is currently obtained over land by weather balloons, but measurements over the oceans have been too expensive to take on the scale necessary for forecasting. Aerosondes will be cheap enough to allow a big improvement.

The craft is guided by an onboard computer that calculates its position from global positioning system (GPS) signals to make sure it's following its programmed course while under way. The computer commands Futaba servos to move the controls; for manual piloting, signals from a conventional R/C transmitter's trainer port are uplinked digitally. A UHF communication system with a range of over 150 kilometers (93 miles) may be used to monitor the craft's position during its flight.

This aircraft has much in common with its radio-controlled relatives: the fuselage is made from fiberglass with some plywood reinforcements, and the 2.9-meter-span (9.75 feet) wing is a hollow structure with graphite and fiberglass skins. The wing even comes from the mold used by RnR Products for competition sailplanes. With a wing area of 0.55 square meters (852 square inches), the wing loading at takeoff weight—78 ounces per square foot—is higher than those of many models. A special launching cradle is mounted atop an automobile so that the Aerosonde can be launched at a safe flight speed without the need for heavy, "draggy" landing gear. A short road is all that's needed to launch the Aerosonde at its 50mph cruising speed.

The engine is a modified Enya 1-cylinder 1.2ci (19.6cc) 4-stroke with spark ignition running on 100-octane aviation gasoline, and it generates 1hp at 5,500rpm. Each Aerosonde costs around $25,000, and the goal is to fly at least 20 missions. Before the first, record-breaking flight, field trials were carried out off the coasts of Western Australia, British Columbia (Canada) and over the South China Sea.

In its record-breaking flight, an Aerosonde named "Laima" (after the Latvian goddess of good fortune) took off at 7:29 a.m. in Newfoundland, Canada, and landed in the Hebrides Islands off Scotland at 1:45 p.m. the next day. It had covered a distance of 3,270 kilometers (1,969 miles) in 26¾ hours with no guidance from any humans! Laima arrived with some rainwater in its fuselage and recordings of wind speeds along its route. Interestingly, Laima was the third attempt at a crossing: of the two planes launched earlier, one never arrived, and the second crashed a few minutes after takeoff due to a software glitch.

Following Alcock and Brown's pioneering Newfoundland to Ireland 1919 transatlantic crossing in a Vickers Vimy bomber, 79 years later, Laima is both the first autonomous aircraft to cross the Atlantic and the smallest.